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Game Emulators: Play your favorite arcade and console games for free

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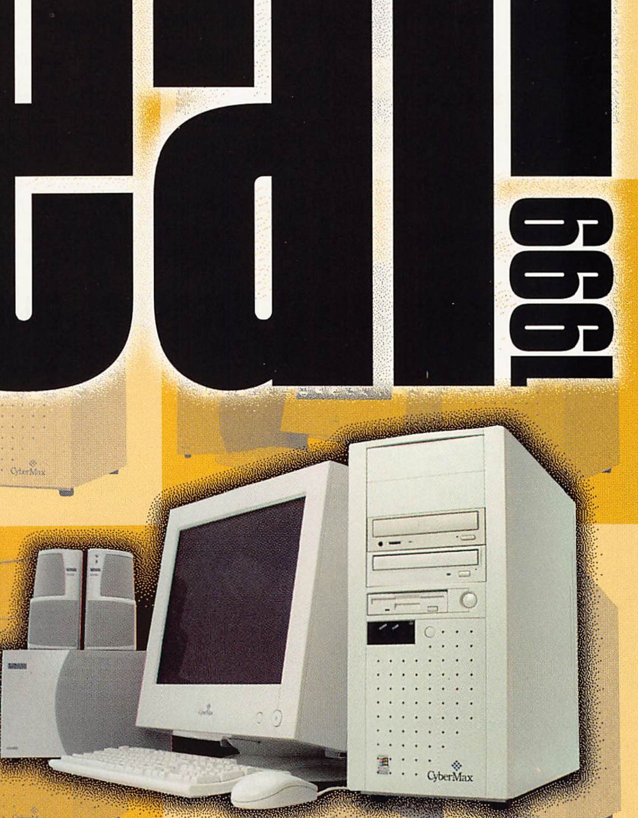

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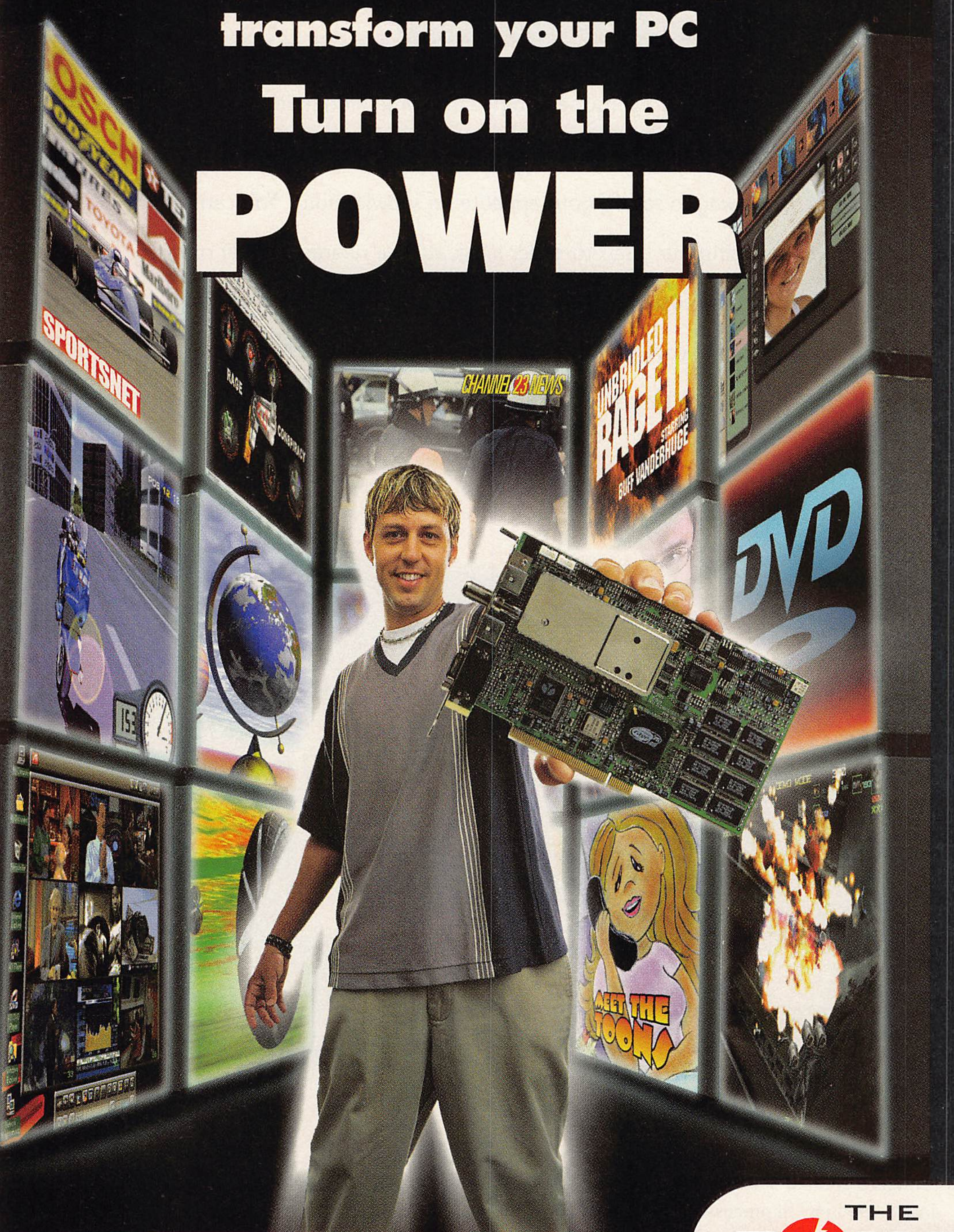

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MAXIMUM PC

► DECEMBER 1999

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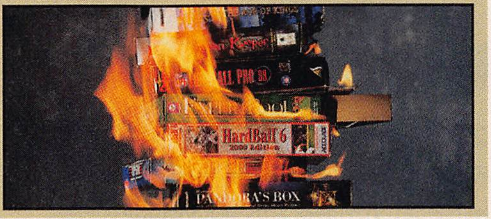

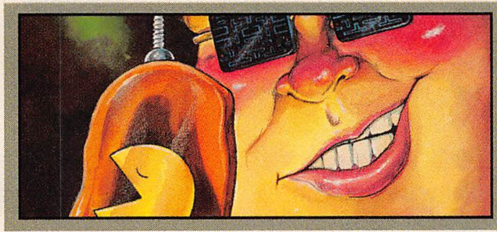

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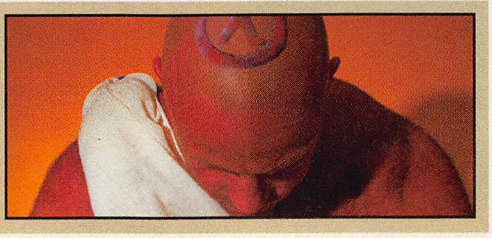

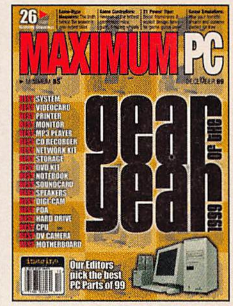

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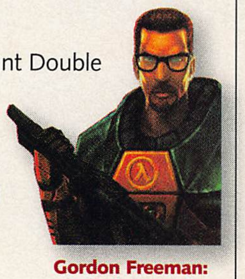

Gordon Freeman: "I feel pretty."

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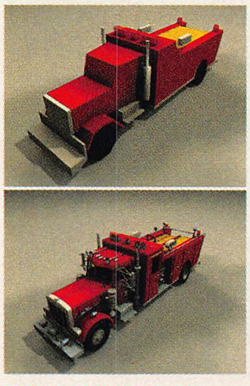
We also explain why RAM prices are so high, and delve into the Camino chipset recall.



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Why do we underline these words?

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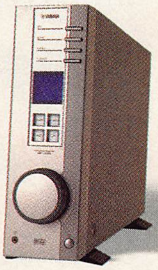

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Alienware Area 51: We test the top-secret Athlon 700 from "them"—it's a close encounter of the fast kind. Attention, gamers: Please step to the front of the vehicle, as this month we give you the 411 on every conceivable **game controller** you'd ever want, as well as the straight dope on nVidia's pixel-pumping **GeForce**. We've got game, too. Check out **Drakan**, **Homeworld**, and **Freespace II**.

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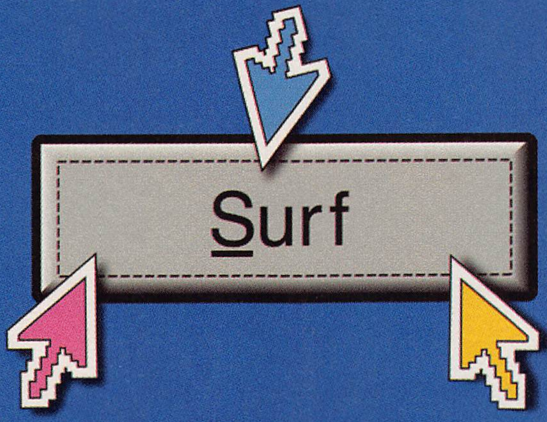

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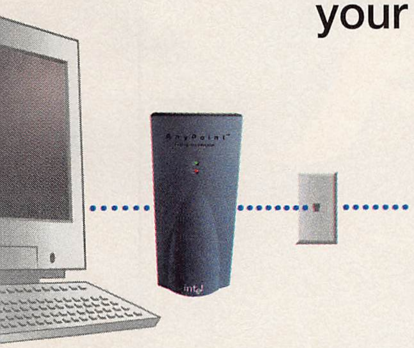

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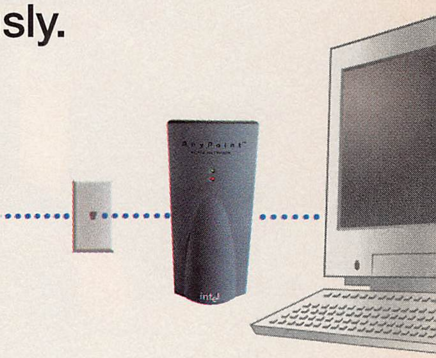

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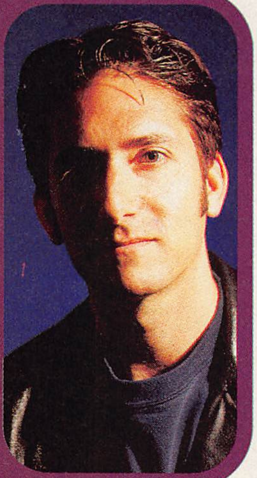

Welcome to the last *Maximum PC* of the second millennium. As we stand teetering on this arbitrary fulcrum point of time and history, it's time to take stock of technological advancements, and reassess our relationship with pure PC power.

The past 1,000 years have seen some marvelous breakthroughs in personal computing. The abacus was an infinitely better calculator of floating-point operations than the number-crunching mystic dwarves of the first millennium, and the math co-processor of the 486 era was an infinitely better floating-point calculator than the abacus.

Indeed, these breakthroughs directly benefited our everyday computing tasks. Fact is, we *needed* to ditch those dawdling dwarves for high-speed abacuses—we had catapult trajectories to calculate! You want to rely on a union dwarf when your castle's being bombarded with flaming dung? Of course not. By the same token, asking abacus power to calculate *Doom* vertices just wasn't cutting it. You haven't seen "slow" until you've seen framerates in the 0.025 to 0.035fps range. Yes, the math co-processor was duly welcomed.

Minimum Posers Posing

But now, we might actually have more power than we need. Ask yourself which of the two following profiles best fits you.

1) The authentic power user: You run hardcore workstation apps when operating in NT, BeOS, or Linux, and pump your display to 1024x768 during frag fests. You truly *need* the fastest CPU and videocard. Shaving minutes off your *Debabilizer* batch processing is worth the money you paid to graduate to Pentium III, and running next year's *Half-Life*-killer at its highest effects settings is worth the money you paid for that GeForce card.

2) The Pure PC Poser: You ordered the fastest, most fully loaded configuration possible—but you'll never use even half of the system's power because you don't run taxing applications, and you have no intention of buying the small handful of games that will truly require next-gen 3D acceleration.

As we stand poised for 2000, we're faced with an embarrassment of PC riches. Power is cheaper and more abundant than ever, and chances are, if you're reading this magazine, you already have a kickin' system. Do you really need to spend money for more juice? Maybe not.

Hardcore creation apps can always benefit from faster CPUs, memory buses, and hard drives, so money spent on these parts is money well spent. But please don't pay for components that you'll never really tax. It's like buying a three-ton SUV for five-minute trips to Burger King.

If you're a casual gamer who never intends to get into workstation-level programs, stick with your current rig until a game developer can give you a compelling reason to upgrade. Instead of improving your CPU, videocard, and hard drive, you should be spending money on a CD-RW and broadband net connection, the killer apps (excuse my French) for 2000.

Of course, this entire column is predicated on the notion that you're already running a 500MHz CPU, 7200rpm hard drive, and TNT2-level videocard. If not, get up to speed, because the aforementioned parts are your minimum Kick-Ass requirements for the new millennium. Anything slower, and you're a prime target for flaming dung. ✺

Jon Phillips
Editor in Chief

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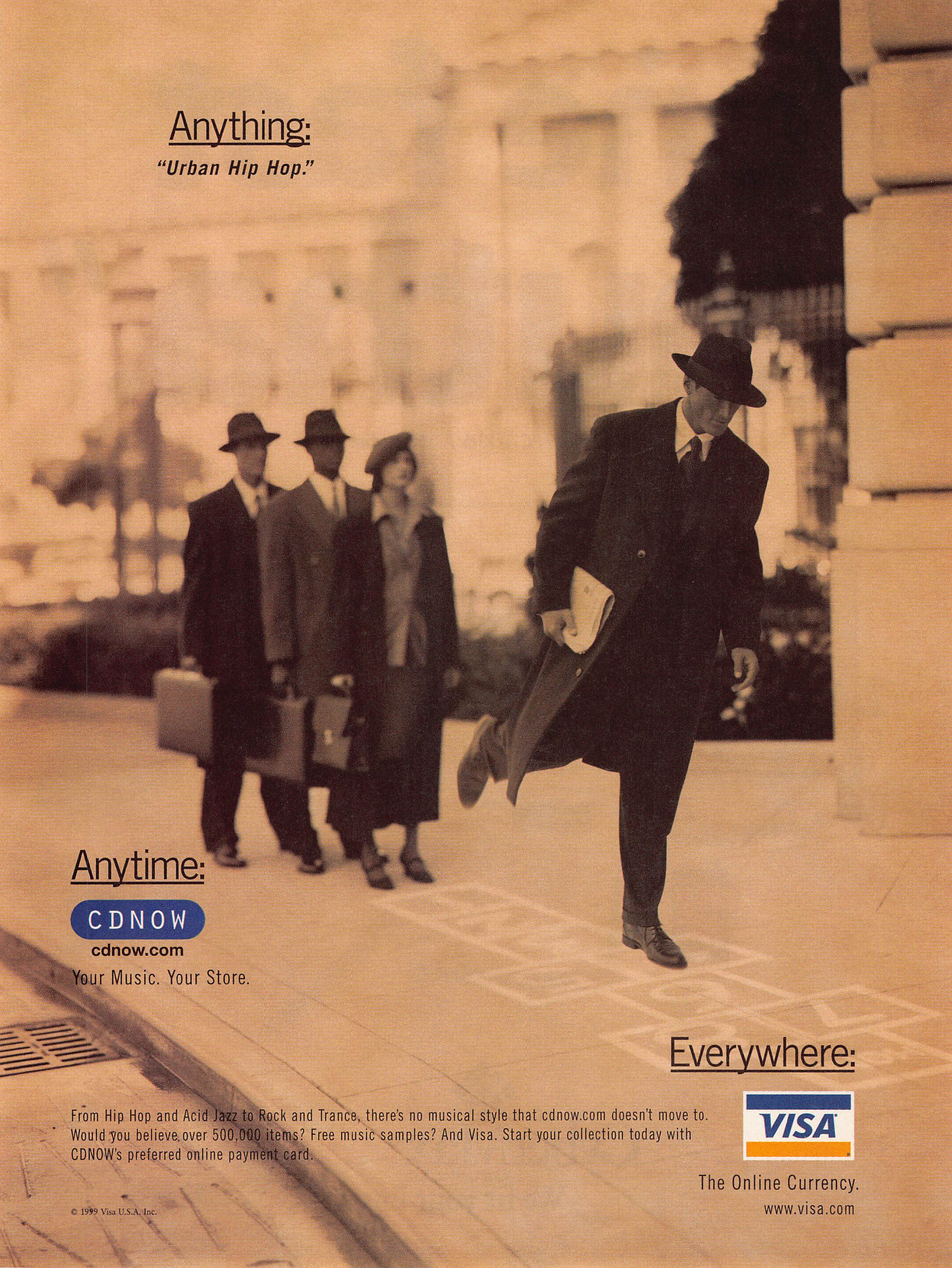

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[1] *PC World* Cover Story: Special Report on Reliability and Service - 11/98.

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COMMPORT

Where Art Thou, Asus?

This month, we received hordes of e-mail from Asus fanatics complaining that we left their favorite motherboard maker out of our October mobo round-up. Hey, folks, we dig Asus, but the fact is the Taiwanese company couldn't send us a P3B-F board in time for the review. This six PCI slot, BX-based mudda is jumper-free, and an overclocker's favorite. Look for one of its progeny in future mobo round-ups.

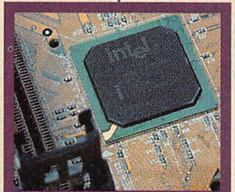
We also received voluminous, hilarious, and even poignant e-mail response to our Gordon Freeman Lookalike Contest. Check out the winners on page 142, and be sure to make frequent visits to our web site, **www.maximumpcmag.com**, for new contest announcements. And, as always, we welcome your comments and suggestions—send 'em to **commport@maximumpc.com**. We can't personally answer every letter, but we will read each and every one.

The Never-Ending Memory-Limit Question

The October CommPort letter titled "Is Windows a RAM Snob?" questioned Windows' ability to address more than 384MB of RAM. You responded that the BX and LX chipsets don't carry that limitation. However, I have heard from a motherboard engineer that the BX (and presumably LX) chipset does indeed carry a 512MB caching limitation—that is, the chipset will support up to 1GB RAM, but since it can cache only 512MB, the system will take a performance hit when addressing any amount above that. Could you please do some research on this and give me a final, bottom-line answer? I'm a *Photoshop* user, and I currently limit my system to 512MB because I don't want to incur a performance hit.

—Gavin Farrington

News editor Gordon Ung responds: We went straight to Intel's chipset division for an answer to your question and learned that the BX and LX chipsets do not carry that limitation. In the Pentium II line, the "cachability" is determined by the CPU. For the original, Klamath-series Pentium II that came in speeds of 233MHz, 266MHz, and 300MHz, the limit was 512KB. For the Deschutes-series, which came in 350MHz, 400MHz, and 450MHz speeds, the limit was 4GB. The Katmai P-III series also maxes out at 4GB, which is much more than the BX chipset supports. However, since the LX chipset doesn't support memory buses higher than 66MHz, it does incur a 512MB limit with Klamath CPUs. You may want to ditch that Klamath CPU for one based on the Deschutes core; according to Intel, Celerons based on the Deschutes core can address up to 4GB of RAM without a performance hit.



The Katmai P-III series also maxes out at 4GB, which is much more than the BX chipset supports.

Mac Envy

As a long time PC fan, the only thing I envy about the Mac is its cool case with the easy-access, pull-down side panel. The G3/G4 case is an upgrader's dream. Is there any case like that for PCs?

—Quoc Pham

Associate editor Josh Norem replies: We're willing to admit that the G3/G4 case with the pull-down mobo tray is darn sweet. Unfortunately, there's nothing like it in the PC world. The best PC fanatics can hope for are cases like InWin's Q-500 (**www.in-win.com**) and Addtronic's 6890A, both of which feature slide-out mommy trays. And, of course, Micron's latest fully integrated machines open up in a flash, offering instant access to add-in cards and all your mobo slots. We should also mention that a lot of PC case manufacturers have been quick to adopt the fruity flavors of Apple's iMac. Frankly, we'd take innovative case designs over wacky colors any day.

Millennium Bug

I read the September 1999 review for the Matrox Millennium G400 MAX, and I am very interested in getting one. But you also said the card was "still-wet-behind-the-ears" in reference to the OpenGL ICD. Is this going to be solved with an updated driver, or is there something wrong with the hardware?

—John

Departments editor Sean Downey replies: There isn't anything wrong with the hardware; the Millennium G400 MAX is an ultra-fast-rendering hot rod that peels out gorgeous visuals. At the time of the review, our main issue with the G400 was the slow performance yielded by Matrox's OpenGL ICD, which was part of the MGA drivers that came with the card. However, the latest MGA drivers (version 5.30) give the MAX a high-octane boost on the OpenGL front. Not only is the OpenGL ICD faster and more stable, but Matrox also developed a new mini OpenGL ICD, similar to 3dfx's miniGL

Editorial Policy: Maximum PC invites letters to the editor; just send 'em to **commport@maximumpc.com**. Please include your full name, home town, and telephone number. Letters may be edited for space and clarity. Due to the vast amount of e-mail we receive, we cannot personally respond to each letter.

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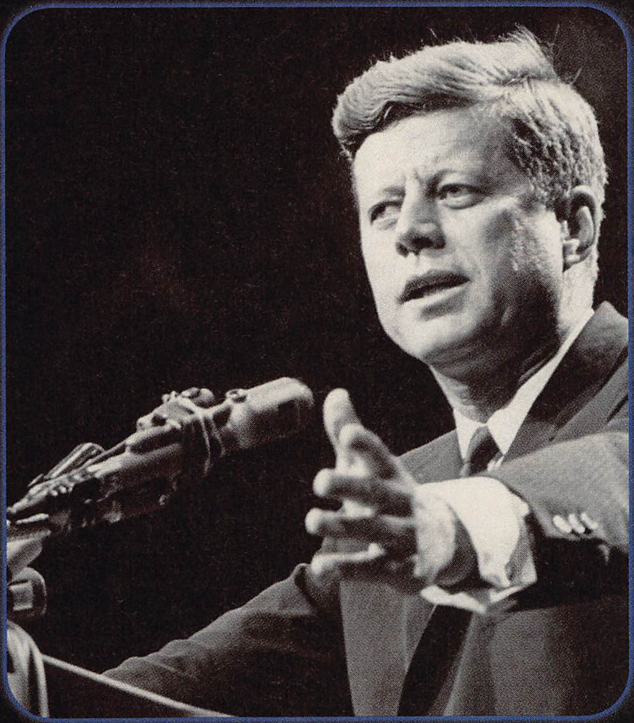
Ask what you can do for your country."
— John F. Kennedy



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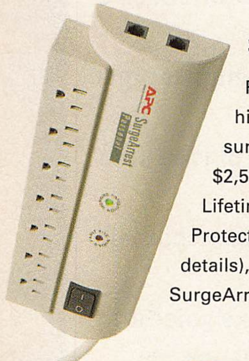

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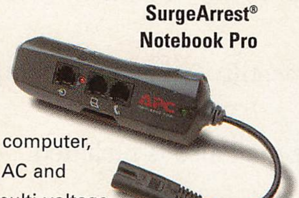

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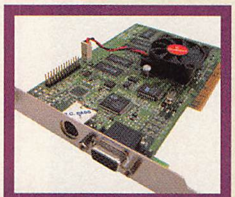
driver. The mini ICD leverages the SSE and 3DNow! instructions of Pentium III and Athlon processors, speeding up *Quake II*, *Quake III*, *Half-Life*, and *Unreal*. We retested the Millennium G400 MAX with the new TurboGL drivers and were duly impressed. The MAX accelerated through our benchmarks, posting an amazing 74.5fps in *Quake II* and 41fps in *Half-Life*.

Too Hot to Trot

I built a modified version of your Dream Machine 99 using a Guillemot graphics card. The system has all the things yours did, including the 500MHz P-III CPU. But the Winbond software says my system temperature is 42 degrees Celsius! Is this bad? I'm afraid for my little baby, and don't want it to be harmed. Please help!

—*Brandon L.*



The Winbond software says my system temperature is 42 degrees Celsius! Is that bad?

News editor Gordon Ung replies: For those unfamiliar with the metric system, 42 degrees Celsius translates to about 111 degrees Fahrenheit, which may be pushing the safety envelope for a system in an ambient room temperature of about 80 degrees Fahrenheit. At *Maximum PC*, we typically run our systems in the 90-to-110 degrees Fahrenheit range with no worries. Then again, we do have a penchant for pyromania.

Your system will run hotter if you're playing graphics-intensive games, thrashing the hard drive, or burning CD-Rs. You should also exercise caution on hot days when your room temperature is above 100 degrees Fahrenheit. If the heat gets extreme, your machine may lock up, exhibit memory errors, or spontaneously reboot. To mitigate these hot environments, you should add a cooling fan or two to your case. Fans should be available at the corner store or at cool places (no pun intended) such as **www.pcpowerandcooling.com**. You shouldn't rely on passive cooling unless you have good airflow in the case, and you're an optimist.

Networking 101

Your issue on networking finally persuaded me to get off my ass and do something about it. After reading all the possibilities, I decided that Ethernet would be the best way to introduce the two PCs in my house, but I still have a few questions. My computers are about 50 feet apart, and I heard from a friend that you can run only 15 feet of CAT5 cable before having to use a repeater. Is this true? Also, is there any advantage to having a hub when I am connecting only two computers? What are the best, most reasonably priced full duplex Ethernet cards? Is there a special kind of cable I need in order to connect two computers directly? And, lastly, where can I get all this stuff?

—*Ian*

Contributing editor Sean Cleveland replies: Ethernet is the perfect choice. Unshielded Twisted-Pair (UTP) cabling is most commonly used for Ethernet networking. CAT5 wire represents the upper echelon of UTP cabling and is your best choice; its quality will support Fast Ethernet speeds of 100Mb/sec. It's always better to use CAT5 from the get-go, so you'll be prepared for later upgrades. Besides, 100BaseT NICs aren't that much more expensive than 10BaseT cards.

The maximum cable length for UTP is 328 feet, so you don't need to worry about length. You won't necessarily need a hub if you're connecting only two machines, but since UTP cables are wired straight through on both ends, having a hub will make it easier to set up. Without a hub, you'll need a "cross-over" patch cable, so that one machine transmits to the other's receive connection, and vice versa. If you're so inclined, you can make your own crossover by hand. You'll need a pair of RJ-45 wire crimpers, an RJ-45 connector, and a wiring diagram (which you can find at **www.digitalmx.com/wires/peer.html**). Cross-overs are also readily purchased online.

We should note that computers tend to multiply with time, and small hubs are inexpensive, so don't dismiss the hub option out of hand. Also, you'll need a hub if you plan to convert a

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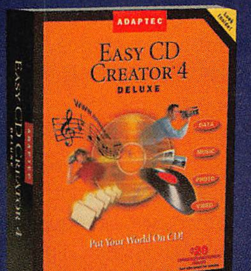

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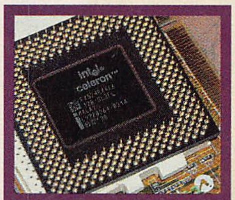
machine into a server. As for networking cards, we highly recommend 3COM's 10/100BaseT NICs. Just be careful of the hub: Some small hubs don't support full-duplex mode. I also recommend the Linksys Etherfast 10/100 "Network In A Box" kit. It's no more than $140 for two cards, two 25-foot UTP cables, and a five-port, full-duplex-enabled hub.

Overclocker's Paranoia

I just purchased an ABIT mainboard and a 366MHz Celeron, which I overclocked to 550MHz. The chip seems to work fine and performance is greatly improved over my 350MHz K6-2. However, there was no label or stamp of identification on the Celeron. Could it be a counterfeit?

—Eric Sandvik



Your S-Spec should correspond to the speed grade you have.

News editor Gordon Ung responds: If you look closely at the printed circuit board of a Slot 1 Celeron, it should display the "S-Spec" number. For example, the number for a 300A Slot 1 would be SL2WM. On Socket 370 processors, look on the underside of the CPU in between the Pin Grid Array. Your S-Spec should correspond to the speed grade you have. According to Intel's site (**http://support.intel.com/support/processors/sspec.htm**) it looks like you should have a S-Spec of either SL35S or SL37Q.

Be aware that it doesn't take much to alter the labeling on a CPU. Luckily, counterfeiters don't spend much time on Celerons, because the return on investment isn't substantial enough. Re-marking a 300MHz Celeron as a 333MHz or 366MHz nets crooks between $25 and $50, compared with the $200 or $300 they could get when the Pentium II was in its prime. If your 366MHz Celeron runs fine at 550MHz, I wouldn't worry about it. Check out this month's White Paper on page 101 for the ins and outs of identifying computer parts.

Diamond in the Rough

Diamond hasn't released any driver updates for its Viper V770 Ultra since June 3. Do you recommend using the reference drivers?

—Stan

Departments editor Sean Downey replies: Unfortunately, Diamond's deal with S3 has cut them off from receiving future code from nVidia. It's unlikely Diamond will release a new set of drivers for your Viper V770 Ultra.

I'd recommend that you use the reference drivers, since nVidia is pretty good about regularly refining and optimizing those puppies. You'll lose Diamond's InControl Tools, but that's the price you'll pay for the latest and greatest. Just remember to properly uninstall Diamond's drivers before you install nVidia's.

Power Failure Time

All new motherboards seem to be ATX-based. While this is great for my home machine, it's causing issues at work. When the UPS shuts down the machine, it won't reboot until someone physically hits the power button. Can I disable this "feature"?

—Craig Diotte

News editor Gordon Ung replies: If you need your machine to boot after a power failure, root around in the "boot" section of the system BIOS; any quality motherboard will have a setting that allows you to command the system to boot up after a power failure.

Reader of the Month
December's accolade goes to Mark H. Miller, a.k.a. Chamsalot, an attorney from Levittown, NY. Mark is a nightly contributor to our online forums (**www.maximumpcmag.com**) and is always ready to chime in with opinions on how we can make the magazine better, and how other users can squeeze more power out of their systems. For the latter part of 1999, no other reader has added so much value to our online marketplace of ideas. Thanks, Chams! ✹

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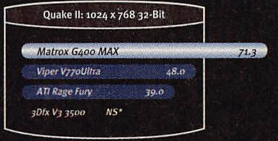

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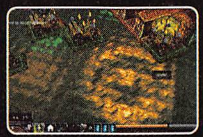

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technology preview ► graphics

Introducing Hardware T&L

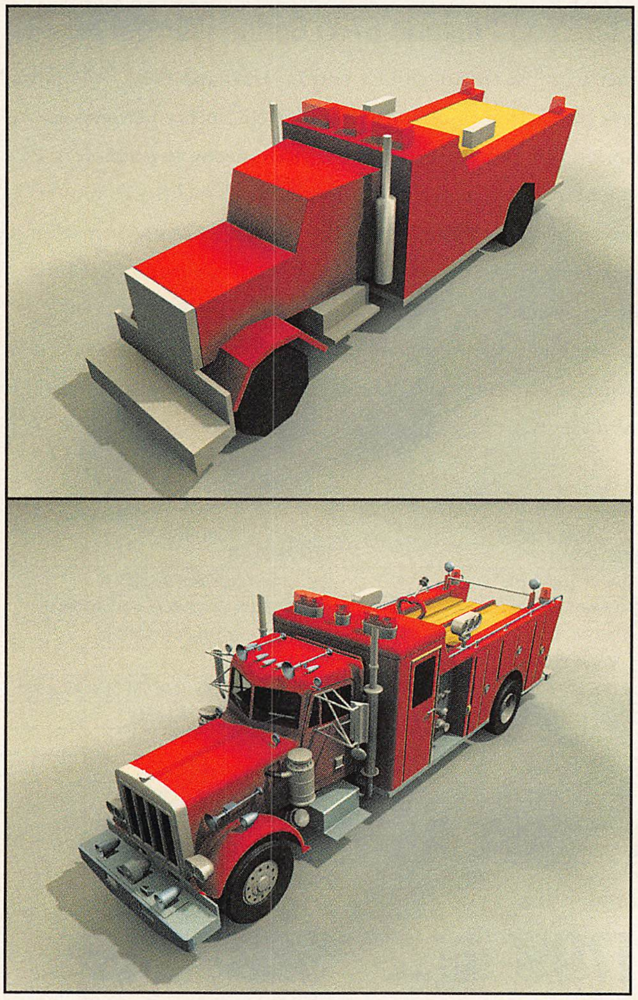
WHY YOUR NEXT GRAPHICS CARD SHOULDN'T BE WITHOUT IT

Call it a revolution, or call it just another feature to be listed on the side of a videocard box—either way, geometry acceleration has arrived, and it promises to take 3D graphics closer to *Toy Story* quality. A number of new graphics processors, led by nVidia's GeForce, are headed to a videocard near you, and they're ushering in the next notable advance in 3D technology: hardware transform-and-lighting acceleration.

Transform and lighting comprise the geometry portion of the 3D pipeline, the assembly line of number crunching that brings a developer's imagination to your screen. In the geometry stage, the coordinates of each object in a scene are calculated according to the viewer's ever changing perspective. This information is handed off to the rendering stage, which actually displays the scene on the screen. The goal of a good transform-and-lighting engine is to constantly feed the rendering stage, enabling it to connect the dots that make up a scene and update the screen every 1/60th of a second with a new frame.

Since the introduction of Rendition's Verite and 3dfx's Voodoo, the rendering stage has been the domain of the 3D accelerator, and floating-point intensive geometry tasks have fallen upon the CPU. However, even with AMD's 3DNow! and Intel's SSE extensions helping to speed up geometry calculations, the general-purpose CPU simply isn't good at pushing triangles. Hardware transform-and-lighting acceleration relieves the CPU of transform-and-lighting duties, allowing graphics processors to push more polygons, resulting in smoother rendered surfaces and more realistic scenes.

The current crop of graphics cards suck up an estimated 40% of the CPU's resources in order to crunch and manage transform-and-lighting operations. With transform and lighting offloaded to the graphics card, that 40% can be used to support better artificial intelligence, physics, and gameplay. Game developers who fully support hardware transform and lighting can take advantage of this increased efficiency and build objects several orders more complex. Rather than "tricking" users into seeing details by mapping textures onto objects built of a dozen polygons, developers can build objects of hundreds or thou-



The fire engine on top uses a few dozen polygons and is about what you would expect from today's technology, although more detail would be added by mapping textures onto it. The fire engine below uses hundreds of polygons for an ultra-realistic result that will scale as you get closer to it.

IMAGES COURTESY OF NVIDIA

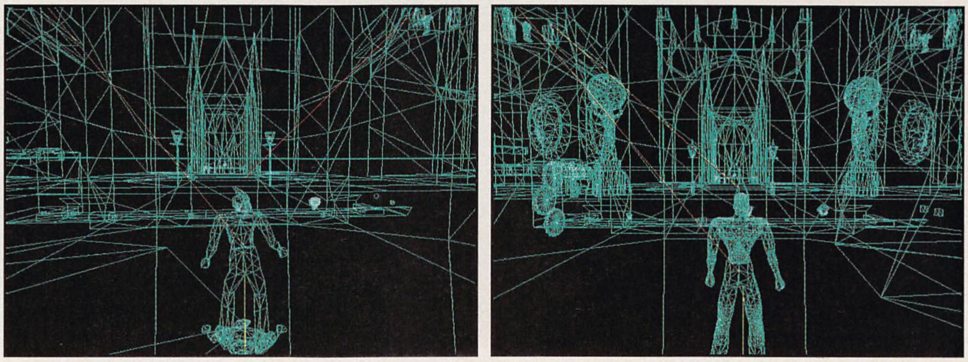
SPIN CYCLE

This month's top stories broken down ►

HEADLINE	NEWS	DETAILS	QUOTE	OUR TAKE
Windows 2000 Headed for 2000	Don't expect to break the shrink wrap on Windows 2000 this Christmas. Microsoft may not ship the new OS until February 2000.	Microsoft reportedly delayed the launch of Windows 2000 in an effort to buy extra development time and avoid launching it during the Y2K crisis.	"We won't ship the product until our early adopters tell us it's ready" says Microsoft Vice President Brian Valentine.	Although it'll be late, at least it will launch in the year it's named for.
3dfx CEO Steps Down	Greg Ballard, the man who brought us the stellar Voodoo and Voodoo^2 graphics chips, abruptly resigned in October.	Ballard said he was stepping aside to let someone with more technical prowess guide 3dfx.	"I truly believe that the challenges in this next phase of the company's growth will be more technical than marketing and strategic," Ballard says.	Did Ballard jump or was he pushed? Ballard may have had one foot off the ledge, with no one from 3dfx there to talk him down.

For definitions of Terminator words, hyperlink to the back of Maximum PC.

sands of polygons, resulting in a level of detail currently unheard of in realtime graphics. And because objects will use more polygons, they'll scale better, so "approaching" an object will no longer render it a blurry, pixelated mess.


On the left is a normal wire frame view of Activision's Shadowman. Notice the amount of polygons used to render the scene. On the right is a T&L-ready frame defined by much more elaborate modeling.

While nVidia's GeForce 256 graphics chipset is currently enjoying the bulk of the hardware transform-and-lighting acceleration hype, it's not the first product to employ the concept; 3DLabs and other high-end chipset makers have used geometry processors before. nVidia *will* be first to market the technology to consumers, but Diamond Multimedia will follow closely behind with the release of its similarly equipped Viper II, the first love child of its merger with chipset maker S3. ATI, Matrox, and 3dfx have all mentioned geometry acceleration as a given in their next-generation offerings. See page 128 for reviews of three GeForce graphics cards.

Questions Remain

In light of the proposed performance gains, the decision to buy a new card seems like a no-brainer—but nagging questions remain about hardware transform-and-lighting acceleration. Some game developers fear that that the new technology will eliminate the unique "look and feel" of different games by shifting control of the transform-and-lighting engine from the developers to the graphics card. But James Monroe, lead programmer of the Raven Software game *Star Trek: Voyager–Elite Force*, says that's not an issue.

"Taking advantage of the hardware just requires some pipeline changes. The content of the game is not restricted at all. The game just has to be more clever about organizing the content to pass it off to the card in the most efficient manner," Monroe told *Maximum PC*.

But what if developers don't like the results from a hardware transform-and-lighting solution, so they decide to write their own?

"It is not a problem. At the point the game wants to render the scene, it will have a list of triangles, which can be passed off to the card in a batch. But if the card doesn't support that, or doing so isn't faster, then we can use our own loop to run through the list. If for some reason the results using hardware T&L are flawed, then there's most likely something wrong with the driver or card," Monroe says.

Like any new technology, it's ultimately the support from developers like Monroe, and the confidence of consumers, that will make or break transform-and-lighting acceleration. The latter may be the most difficult hurdle. Since very few titles currently on store shelves will support transform-and-lighting acceleration, gamers will gain little from using the technology with their current library. Thus, graphics-card companies are hedging their bets, and focusing more on such features as texture compression, anti-aliasing, and pixel-pushing speed. They may have the right idea. Urging consumers to invest in transform-and-lighting hardware before applications that use it hit the market hardly makes for a successful marketing campaign.

—Gordon Ung

Games Supporting Hardware T&L >>>

While several games have announced support for hardware transform and lighting, it doesn't mean that they're letting the videocard handle the entire 3D engine.

Here's a partial list of upcoming games that support hardware T&L in one form or another.

Game	Developer
Quake III	id Software
Tribes 2	Dynamix
Drakan 2	Surreal
Messiah	Shiny
Giants	Planet Moon
Halo	Bungie
Oni	Bungie
Black & White	Lionhead
Shadowman	Acclaim
Test Drive 6	Pitbull
Mig Alley	Interplay
Stonekeep 2	Interplay
Midnight GT	Rage

to the pertinent details.

HEADLINE	NEWS	DETAILS	QUOTE	OUR TAKE
Squeeze Cows Endanger Children	A Gateway promotional toy poses a serious risk to children, who could accidentally choke on it.	Gateway says small children are biting off and swallowing pieces of the stress toy, and could choke as a result. Gateway is recalling 1 million of the cows.	"Moooo," said Gateway mascot Randy.	Keep those cows away from your kids—or feed your kids better.
Apple Does the Right Thing	Unable to produce 500MHz G4 Macs, Apple tried to substitute slower computers at higher prices.	Apple flip-flopped on the decision several times, but in the end lowered prices for those who pre-ordered the machines	"Good companies make mistakes. Great companies fix them," said Apple acting CEO Steve Jobs.	Good companies also know the limits of customer loyalty.

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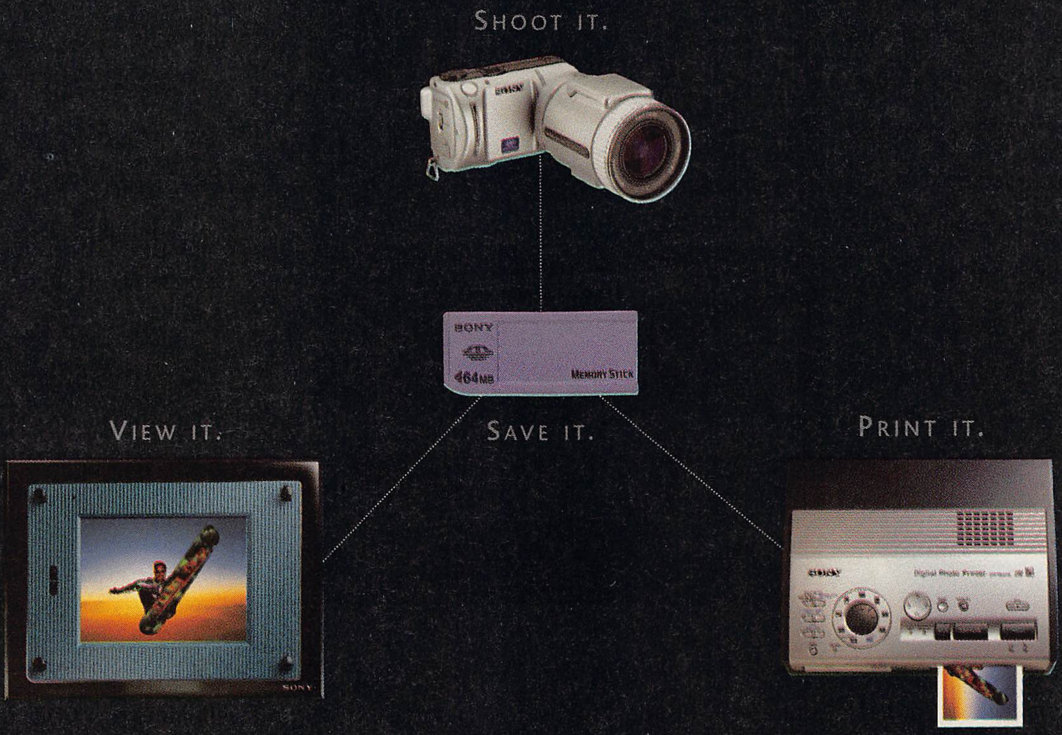

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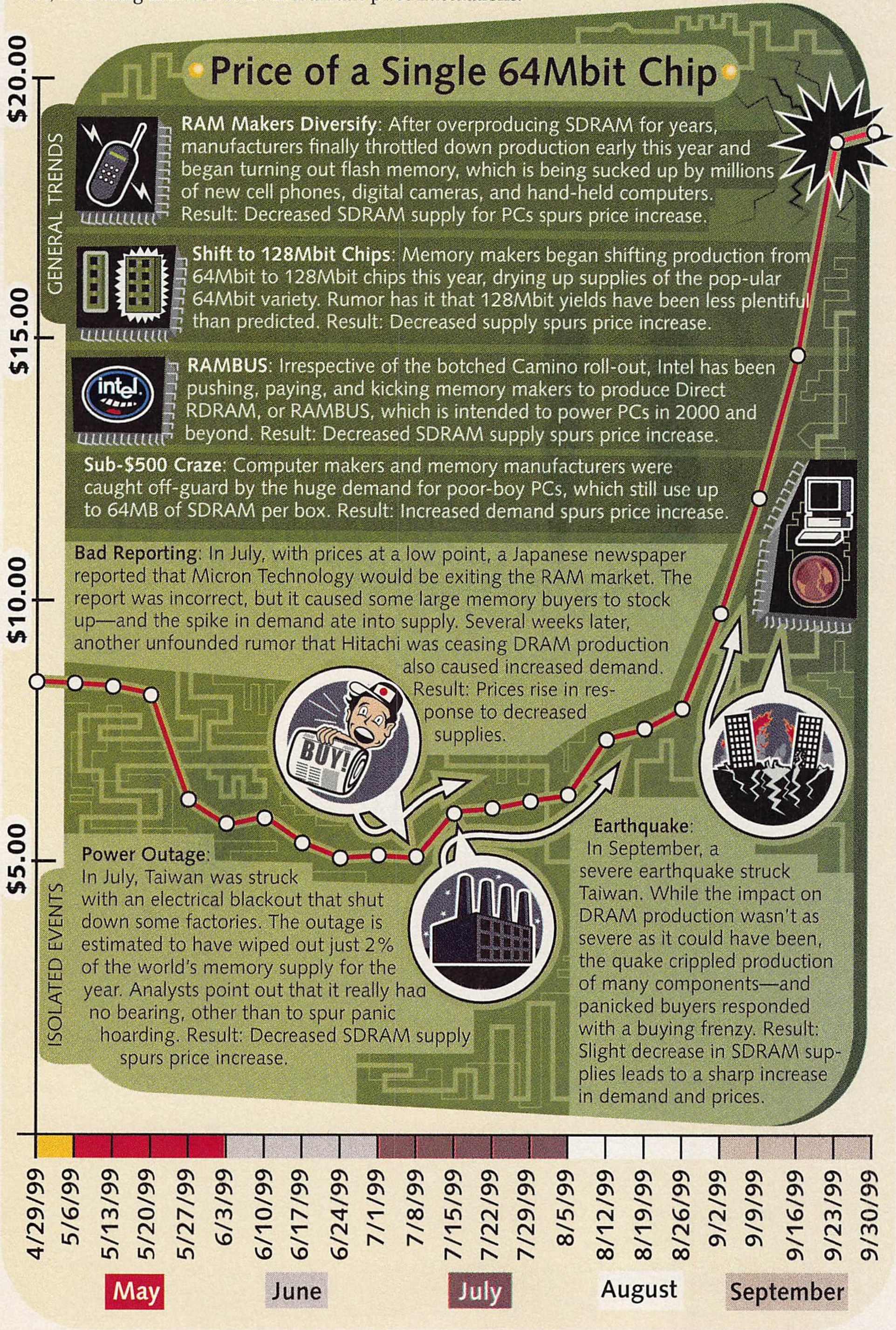
What's the Deal With RAM Prices?

Memory prices have more than tripled in the last few months, and there's no end in sight. We interrogated memory-chip makers, module makers, and analysts for their take on what's causing the hike. The verdict? Multiple factors are converging to push prices through the roof.

The RAM "spot market" has seen the largest price increases, directly affecting individual consumers and small PC manufacturers that purchase memory in spot bundles. Larger PC makers such as Dell, IBM, and Compaq have long-term, fixed-price contracts with memory manufacturers, insulating themselves from dramatic price fluctuations.



Price of a Single 64Mbit Chip

RAM Makers Diversify: After overproducing SDRAM for years, manufacturers finally throttled down production early this year and began turning out flash memory, which is being sucked up by millions of new cell phones, digital cameras, and hand-held computers. Result: Decreased SDRAM supply for PCs spurs price increase.

Shift to 128Mbit Chips: Memory makers began shifting production from 64Mbit to 128Mbit chips this year, drying up supplies of the popular 64Mbit variety. Rumor has it that 128Mbit yields have been less plentiful than predicted. Result: Decreased supply spurs price increase.

RAMBUS: Irrespective of the botched Camino roll-out, Intel has been pushing, paying, and kicking memory makers to produce Direct RDRAM, or RAMBUS, which is intended to power PCs in 2000 and beyond. Result: Decreased SDRAM supply spurs price increase.

Sub-$500 Craze: Computer makers and memory manufacturers were caught off-guard by the huge demand for poor-boy PCs, which still use up to 64MB of SDRAM per box. Result: Increased demand spurs price increase.

Bad Reporting: In July, with prices at a low point, a Japanese newspaper reported that Micron Technology would be exiting the RAM market. The report was incorrect, but it caused some large memory buyers to stock up—and the spike in demand ate into supply. Several weeks later, another unfounded rumor that Hitachi was ceasing DRAM production also caused increased demand. Result: Prices rise in response to decreased supplies.

Power Outage: In July, Taiwan was struck with an electrical blackout that shut down some factories. The outage is estimated to have wiped out just 2% of the world's memory supply for the year. Analysts point out that it really had no bearing, other than to spur panic hoarding. Result: Decreased SDRAM supply spurs price increase.

Earthquake: In September, a severe earthquake struck Taiwan. While the impact on DRAM production wasn't as severe as it could have been, the quake crippled production of many components—and panicked buyers responded with a buying frenzy. Result: Slight decrease in SDRAM supplies leads to a sharp increase in demand and prices.

Rambus Fiasco: What's the 411?

In what may be Intel's worst PR disaster ever, the world's chip king abruptly pulled the plug on its flagship "Camino" 820 chipset launch just days before it was to be released this September.

The cause? A glitch that could cause data loss on motherboards equipped with three Direct RDRAM slots. Regardless of whether that third slot is filled or unfilled, mobos with three slots can lose data as it makes its way aroun the PCB—or so goes the scuttlebutt.

Intel's last-minute decision was also a massive setback for Intel partners such as Dell and Gateway. The Camino chipset was to have powered next-gen machines with such new features as a 133MHz system bus, 4X AGP, and ATA/66 hard drive support. In last month's issue, under the assumption that the system would ship as planned, *Maximum PC* reviewed a Dell B600 system equipped with a three-slotted Camino motherboard. Dell claims that our benchmark findings were untainted by the chipset glitch.

Because the mobo recall was so sudden, manufacturers had no time to pull ads and catalogs pimping Camino machines. Manufacturers caught up in the mess say consumers will be redirected to older BX-based systems. Meanwhile, manufacturers such as Micron are hawking machines based on the VIA VT694X chipset, which is currently the only Pentium III-based chipset to offer 133MHz system bus support.

The long-term impact of the 820 snafu could be disastrous for Intel as it tries to establish Direct RDRAM as the new memory standard. With 820 and its big brother 840 in limbo indefinitely, Direct RDRAM will give competing technologies such as VC133 SDRAM and Double Data Rate SDRAM a chance to emerge. ✸

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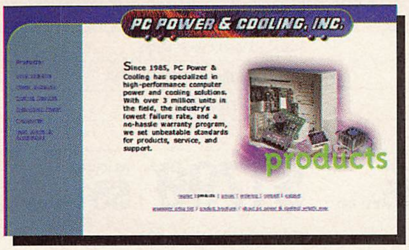
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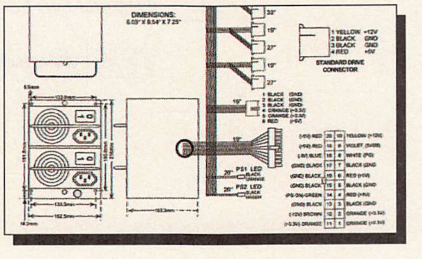
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19"
27"
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(PS-ON) GREEN 14
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(GND) BLACK 13
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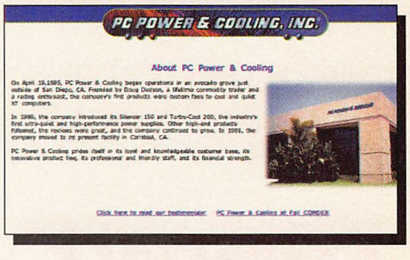
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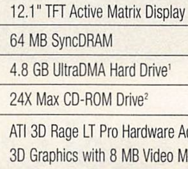

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ATI 3D Rage LT Pro Hardware Accelerated 3D Graphics with 8 MB Video Memory	ATI 3D Rage LT Pro Hardware Accelerated 3D Graphics with 8 MB Video Memory	ATI 3D Rage LT Pro Hardware Accelerated 3D Graphics with 8 MB Video Memory	ATI 3D Rage LT Pro Hardware Accelerated 3D Graphics with 8 MB Video Memory
56K ITU V.90 Modem (PCI)[3]	56K ITU V.90 Modem (PCI)[3]	56K ITU V.90 Modem (PCI)[3]	56K ITU V.90 Modem (PCI)[3]
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1 MB L2 Pipeline Burst Cache	1 MB L2 Pipeline Burst Cache	1 MB L2 Pipeline Burst Cache	1 MB Tri-Level Cache
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Microsoft Windows98	Microsoft Windows98	Microsoft Office 2000 Small Business Edition®	Microsoft Windows98
		Microsoft Windows98	
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faster downloads from K56flex- or V.90-compliant digital sources. Maximum achievable download transmission rates are currently unknown, may not reach 56 kilobits per second (Kbps), and will vary with line conditions. [4]4X DVD-ROM Drives run at a higher maximum transfer rate of up to 5400 Kbps compared to 2nd generation DVD-ROM Drives which run at a maximum transfer rate of up to 2705 Kbps. One year parts and labor. Labor for notebook systems is pick-up service. Compaq, the Compaq Logo, and Presario are registered in the U.S. Patent and Trademark Office. Microsoft® Windows®98 installed. Microsoft, MS, and Windows are registered trademarks of Microsoft Corporation. AMD and AMD-K6 are registered trademarks of Advanced Micro Devices, Inc. Product and company names mentioned herein may be trademarks and/or registered trademarks of other companies. Call Compaq Monday–Friday, 7:00am–11:00pm (CT). ©1999 Compaq Computer Corporation. All rights reserved.

▶ Maximum PC takes a bite out of bad service and gear

WATCHDOG

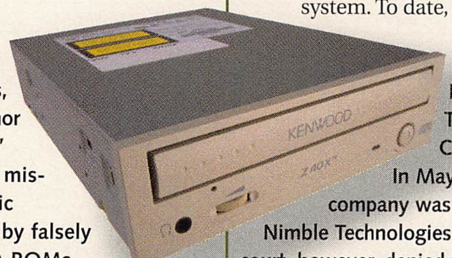
ILLUSTRATION BY SCOTT LAUMANN

Got a bone to pick with a vendor? Been spiked by a fly-by-night operation? Sic the dog on them by writing **Watchdog@maximumpc.com**. The Dog promises to get to as many letters as possible, but only has four paws to work with.

TRUE-X LITIGATION BEGINS

Did Kenwood and Hi-Val defraud consumers by selling a 40x40 CD-ROM drive that didn't live up to its advertising? That's what Philadelphia attorney Jonathan Shub contends in a lawsuit filed against the two companies over the controversial 40x40 True-X CD-ROM drive.

Shub filed the suit in San Francisco Superior Court on behalf of Jeremy Gotcher, who purchased a 40x40 True-X drive from Hi-Val in 1998. The suit alleges that the companies' "misrepresentations and omissions of material fact ... defrauded owners of 40x40 CD-ROMs and the general public in violation of California Civil Code."



The Kenwood Drive

The suit alleges that the drive is unable to reliably read data due to "unusual vibrations and grinding noises, and that neither the PC's system BIOS nor Windows properly recognizes the drive."

"Defendants' advertising is untrue, misleading, and likely to deceive the public and/or has deceived the public by falsely representing that the 40x40 CD-ROMs perform in accordance with industry standards when in fact they do not," states the suit.

> **"Nimble Technologies, a.k.a. BJMT Technology Corp., has proven to be not-so-nimble. "**

Shub is asking the court to classify the suit as a class action on behalf of all those who purchased the drives. Hi-Val and Kenwood officials declined to comment, citing pending litigation, but Shub says he's willing to answer questions about the case. He can be reached by e-mail at **jshub@sheller.com**.

This isn't earth-shattering news. **THE DOG** first barked about readers' reliability concerns regarding the True-X drive in the September issue of Maximum PC. Kenwood officials told the Dog at that time that the drive didn't have a higher-than-average return rate. But do our readers' real-world experiences live up to that claim? To find out, the Dog asked readers for their take on the 40x40 True-X drive. 125 respondants said they had severe problems with one or more 40x40 True-X drive; six said the 40x40 was a champ worthy of the magazine awards it has racked up. While the poll was hardly scientific, it does hint that there may be more to this story than we know.

Many readers also felt compelled to dish about Kenwood's 52X True-X CD-ROM drive. A notable number said it was worthy of the title "fastest CD-ROM on earth," but an equally large contingent called it reheated garbage.

One point on which almost everybody seems to agree is that Kenwood has ramped up its support of the drives. Several readers reported that Kenwood has shown exemplary customer service, promptly replacing problematic 40x40 and 52X drives that are under warranty. Hi-Val, meanwhile, continues to offer displeased customers the option to swap out a 40x40 for a normal 50X CAV drive. Keep your eyes on this space for updates on the True-X drive suit.

NOT-SO-NIMBLE TECHNOLOGIES

DEAR DOG I have been trying since February to get Nimble Technologies to respond to the e-mail and letter I sent to the company's president, regarding a problem with the Motorola SM56 Smart Modem that came with my system. To date, not one person has contacted me.

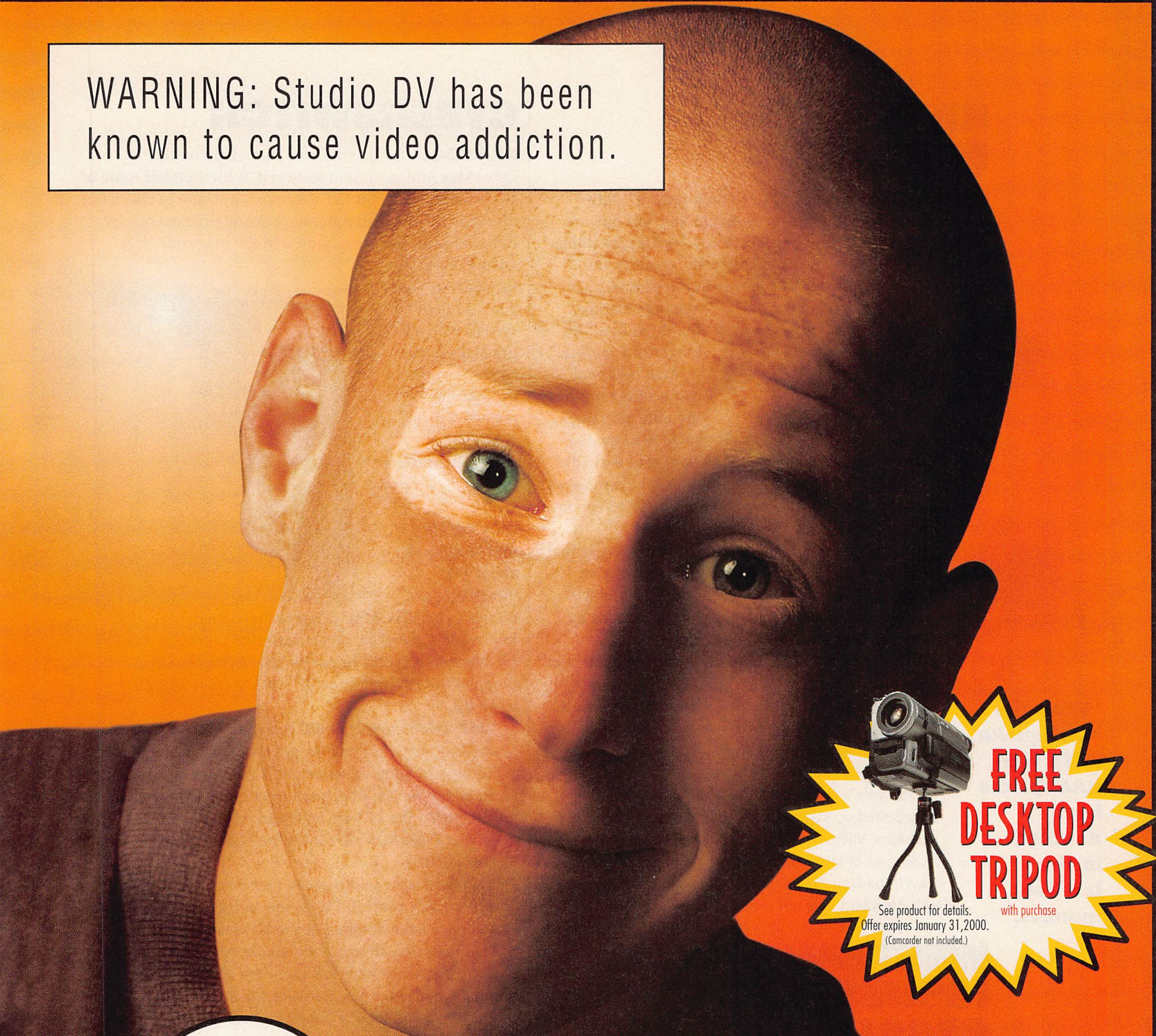
—Norman E Cozad

Bad news, Norm. L.A.-based Nimble Technologies, a.k.a. BJMT Technology Corp., has proven to be not-so-nimble. In May of this year, two months after the company was put under court-ordered receivership, Nimble Technologies filed for bankruptcy. The bankruptcy court, however, denied the company's application for Chapter 11 protection from creditors, electing instead to preserve the receivership. Receiverships are granted in order to safeguard the holdings of a debtor's largest lien holder. Control of the company is given to a receiver, whose edict is to either salvage the company or sell it. In Nimble's case, the receivership intends to liquidate the company's assets.

Those managing Nimble's liquidation have attempted to reach consumers whose computers were in for repair when the company folded, but if you haven't heard about your Nimble computer, contact the company at 714.772.7590, or write them at 675 West Foothill Blvd. Suite 200, Claremont, CA 91711 attn: Nimble Technologies or BJMT.

What brought down Nimble? Poor customer service may have played a part. According to the Southland Better Business Bureau, Nimble had an "unsatisfactory rating," with several complaints filed that alleged the company was shipping defective merchandise, not completing orders, or simply not sending merchandise that had been purchased. Of the 152 complaints filed with the BBB against Nimble, only one was settled with positive results. Another eight are assumed to have been settled as satisfied. The rest were up in the air at the time Nimble fell flat.

WARNING: Studio DV has been known to cause video addiction.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KIWI EATEN FOR LUNCH

Kiwi Computers, makers of "open architecture" notebooks, has apparently been chewed up and spit out. Although the Dog could not locate any bankruptcy filings for the San Francisco Bay Area company, a call to the company's main number was met with a recorded message stating that Kiwi was "no longer in business."

Kiwi notebook owners may not be the only casualties. A check of public records databases shows Kiwi owned Aura Microsystems of Fremont, CA, a company that sold systems primarily to federal, state, and local governments. The Dog tried to reach Aura via three different telephone numbers, but all three were disconnected.

One consolation for Kiwi notebook owners is that a Bay Area company called Sunware says it can repair any Kiwi notebook except the 820 and 810 models, which were apparently manufactured by Mitac or Featron (www.mitac.com, www.featron.com.tw). Contact those companies for repair work. No repairs performed by Sunware will be covered by defaulted Kiwi warranty agreements, but it's a lot better than making your notebook into an expensive paperweight. You can reach Sunware at 510.249.1188.

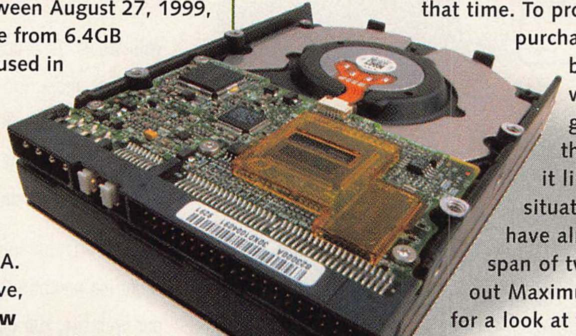
Sunware's owner told The Dog he believes Kiwi only pulled up stakes in the United States. Both Kiwi and Aura Microsystem's web sites were still functioning as of late September. So, what happened to Kiwi? The Dog doesn't know. A call to the home of Kiwi's president was not returned at press time.

"With the earthquake in Taiwan, RAM prices have doubled in the last few months."

WESTERN DIGITAL ISSUES DRIVE RECALL

Nearly half a million Western Digital 5,400 RPM drives may fail to fire up after six to 12 months of use, due to a faulty chip supplied to Western Digital by a subcontractor. The drives, which were manufactured between August 27, 1999, and September 24, 1999, range in size from 6.4GB to 20.5GB. The faulty chip was NOT used in any SCSI drives or WD Expert, Enterprise, or Performer series drives. The model numbers of the faulty drives are WD64AA, WD68AA, WD84AA, WD100AA, WD102AA, WD135AA, WD136AA, WD170AA, WD172AA, WD200AA, and WD205AA.

To check your Western Digital drive, download a hard-drive test from **www.westerndigital.com/fitness/drive-alert.html.** (Warning: Do not use the test on drives other than those listed!) If your drive fails the test, contact Western Digital at 800.357.1374.

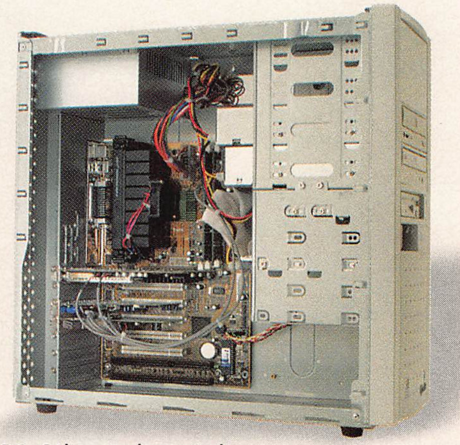


The Western Digital Drive

CYBERSWITCH

DEAR DOG Could you shed some light on the CyberMax Athlon system reviewed in the October issue of *Maximum PC*? I went to Cybermax's web site to check out the AP6 and found that the system and price were very different from the price quoted in the magazine. Is it normal for manufacturers to send you a souped-up system with a low price, then tell consumers that the system reviewed isn't available? It seems misleading.

—*Larry*



Larry isn't the first to squawk about the increased price on the CyberMax AP6. Other readers cried foul when CyberMax also substituted a Phillips CD-RW for the Sony CD-RW in our review. CyberMax also dropped the configuration of SDRAM from 256MB to 64MB.

THE DOG contacted Bill Bisignano, VP of Sales and Marketing for CyberMax, to get the poop. Bisignano said a shortage of Sony drives forced CyberMax to temporarily swap drives for the Phillips, but said the swap was in customers' favor; the AP6 we reviewed featured a 6x DVD-ROM drive, and CyberMax now ships the system standard with an 8x DVD-ROM.

Bisignano also said that the memory crisis is simply out of CyberMax's control. "With the earthquake in Taiwan, RAM prices have doubled in the last few months, and that's something affecting the whole industry. Unfortunately we're not able to supply the 256MB at the price originally quoted. If people want the Sony CD-RW they can get that, but they're subject to availability," Bisignano told The Dog.

The Dog must note that it's common for PC builders to swap components when supply dries up. In most cases, PC magazine reviews are done two or three months before a system gets to the public. A lot can change in that time. To protect yourself when purchasing a PC, ask by brand and model type what components you're getting. We can confirm that CyberMax is telling it like it is on the RAM situation; DRAM prices have almost tripled in a span of two months. Check out Maximum PC's news section for a look at the reasons why.

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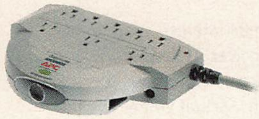

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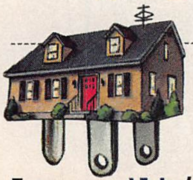

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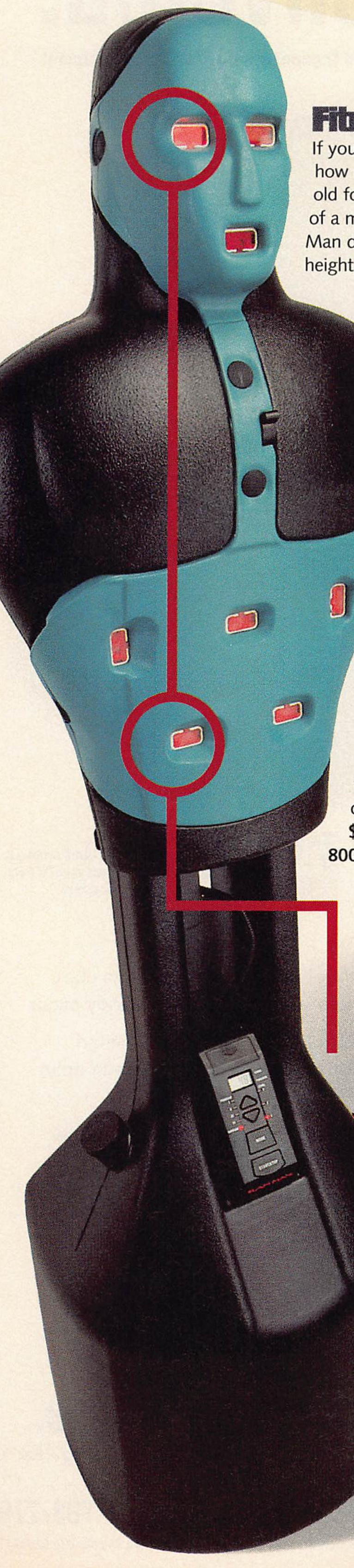

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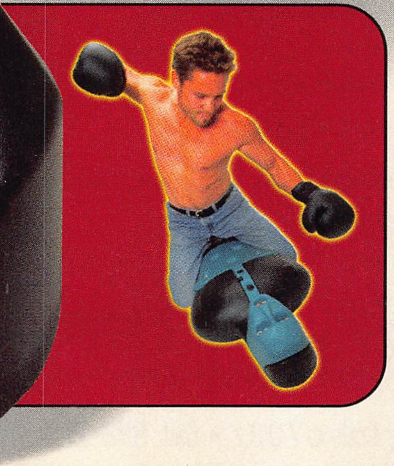
$300; Fitness Quest; www.fitnessquest.com; 800.321.9236

Slammy likes head and body blows. But dirty fighting is not allowed!



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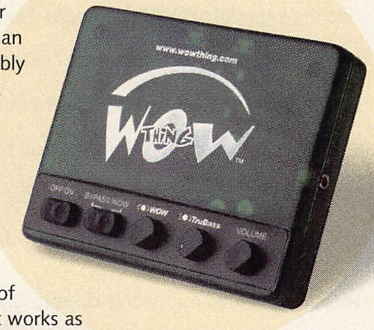

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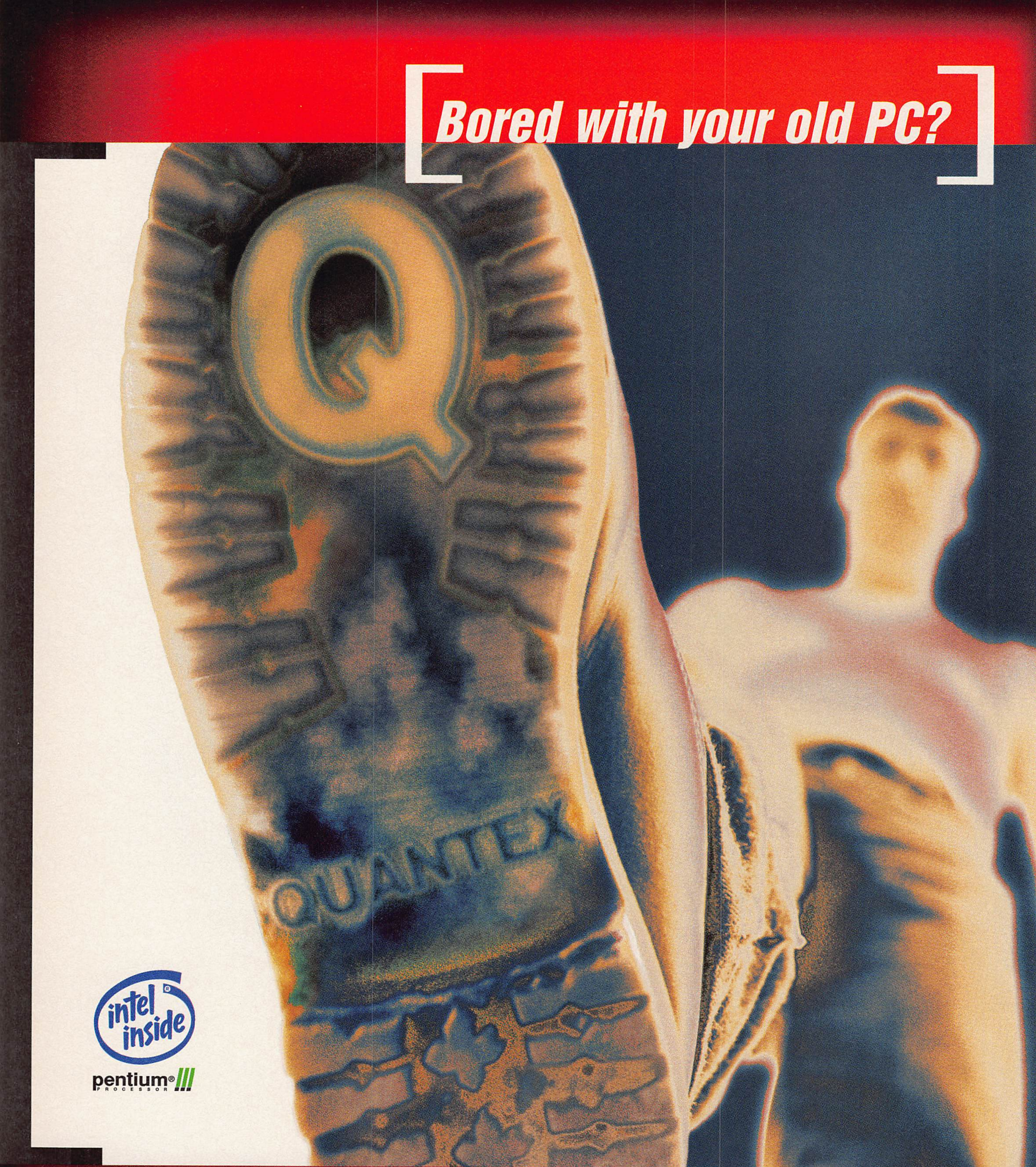
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Your Future Superchip

HOW CHIP MULTIPROCESSING (CMP) MAY AFFECT THE NEXT MACHINE YOU BUY

It's been anticipated for years, and now I think it's finally going to happen. No, I'm not talking about the resurrection of Elvis Presley. I'm talking about a technology called chip multiprocessing (CMP), which will put the processing power of today's expensive servers into an affordable desktop PC.

You may already know about a similar technology called symmetric multiprocessing (SMP). Don't confuse CMP with SMP; the difference is subtle, but important. It's a difference that could eventually save you thousands of dollars.

SMP has been around for years and is often used in servers, workstations, and high-end PCs. SMP machines have two or more microprocessor chips instead of the single microprocessor found in a typical PC. For example, a server might have two, four, eight, or more processors attached to a single motherboard; Intel's Xeon processors are commonly used in this manner. Many other SMP machines, such as the PowerPC, MIPS, or Alpha, use RISC chips.

Obviously, adding more CPUs dramatically boosts a computer's horsepower. But it's an expensive prospect, because you're paying for multiple CPUs, high-end motherboards, and the special core-logic chipsets required to make the set-up work. That's why CMP is so exciting—it will bring the virtual equivalent of SMP to ordinary PCs at a fraction of the cost.

The key difference between SMP and CMP is that the former puts multiple processors on a motherboard, while the latter puts multiple processors on a chip. In other words, CMP enables a single microprocessor chip to contain two or more processor cores on the same piece of silicon. From the outside, it looks like a regular chip. On the inside, it has multiple independent processor cores, each of which can run a different program or different parts of the same program. That's why it's called "chip multiprocessing." The bottom line is, you'll get much more processing power for the price of a single chip.

To make this possible, fabrication technology must advance to the point where manufacturers can squeeze enough transistors onto a chip to build those multiple cores. That's finally starting to happen. And not surprisingly, engineers are starting to design CMP processors.

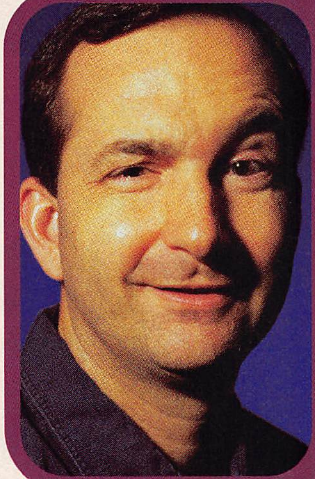
Don't be surprised if a future issue of Maximum PC raves about a CMP Dream Machine that shatters benchmark records.

Until now, CMP has been limited to highly specialized chips such as digital signal processors (DSPs). One example is the TMS320C80 from Texas Instruments, which crams the equivalent of a RISC processor and four DSPs onto a single chip. But last summer, two announcements from major companies brought CMP to the forefront: Sun's Microprocessor Architecture for Java Computing (MAJC) and Intel's Internet Exchange Architecture(IXA).

MAJC (pronounced "magic") allows a single chip to contain up to 1,024 processor cores—many more than today's fabrication technology will allow. The first MAJC chip will probably have only two proc cores, but MAJC indicates where CMP is ultimately going. MAJC chips will probably appear first in digital TV set-top boxes, automotive-navigation systems, smart phones, and other futuristic appliances.

Intel's first CMP chip, the IXP1200, boasts seven processor cores. It's designed for use in network routers, not in PCs, but again, it proves that CMP technology is on the verge of breaking into the mainstream.

When will CMP chips appear in ordinary PCs? I'd say within the next few years, which means they could be in the next system you buy. Don't be surprised if a future issue of *Maximum PC* raves about a CMP Dream Machine that shatters benchmark records. ✱



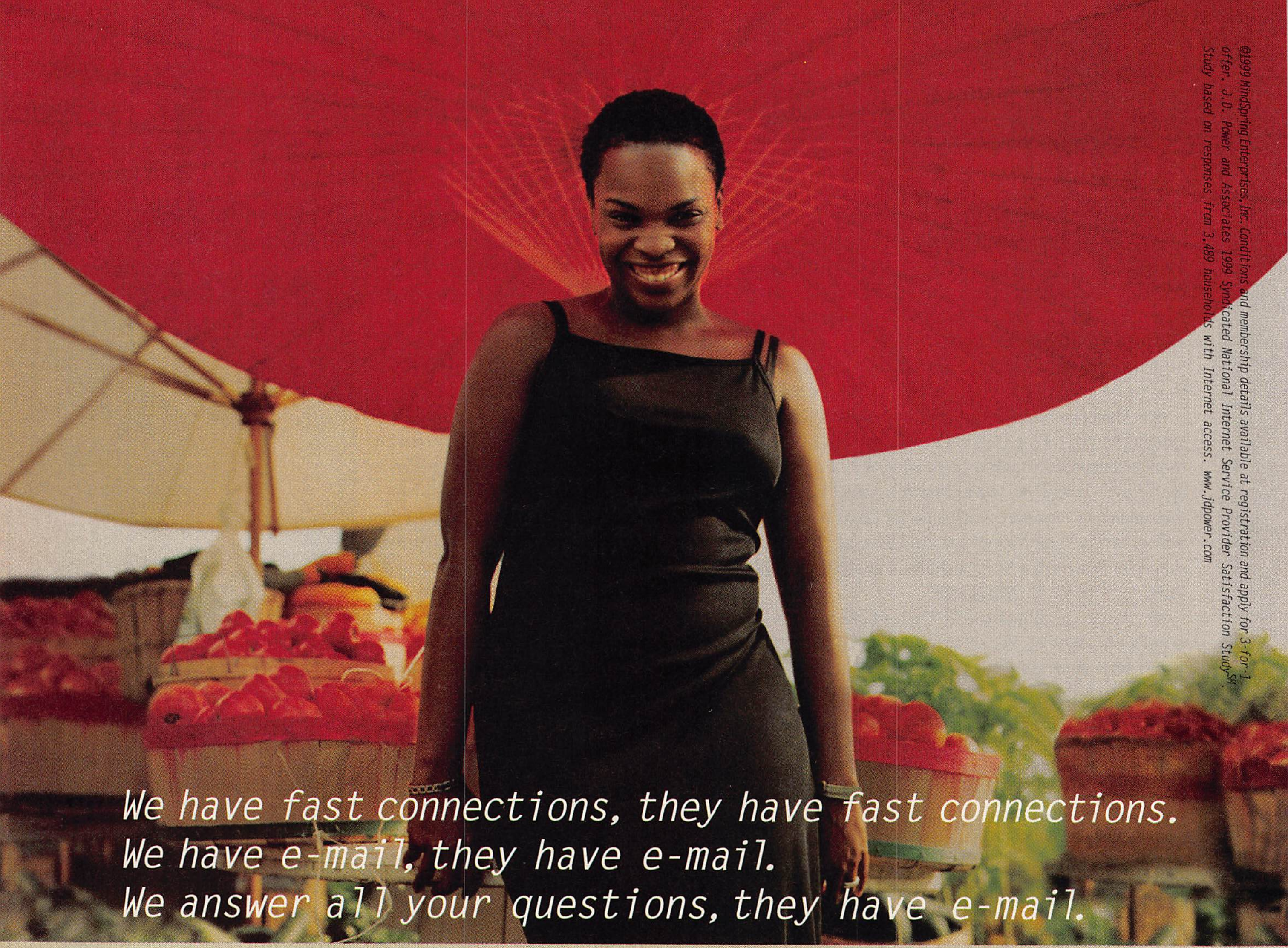
TOM HALFHILL was senior editor at Byte magazine and is regarded as one of the most knowledgeable experts on processor technology in the industry. Contact him at **thalfhill@maximumpc.com.**

Random Thoughts

▶ Fast 3D graphics performance requires more than just fast processors. Fast memory is also key, because 3D graphics cards need rapid access to textures and other data. A new 3D graphics processor from Finland attacks this problem by embedding 9MB of high-speed memory right on the chip. It's called the Bitboys Glaze3D 1200, and it can draw up to 600 million pixels per second—nearly twice the performance of today's fastest 3D graphics processors. The chip is still in the design phase, but should be ready for mass production early next year.

▶ Sega's Dreamcast, a next-generation home videogame console, runs Windows CE as its native operating system and uses DirectX, too. That means you're likely to see more crossover titles: Dreamcast games that are ported to Windows PCs, and Windows games that are ported to the Dreamcast. For avid gamers, it's a dream come true.

▶ If you're shopping for a color ink-jet printer and want "photo-realistic" reproduction, the dots-per-inch (dpi) resolution doesn't tell the whole story. Ask about the dot size, too—it's usually expressed in picoliters. Smaller is better. Two printers with identical 720x1440 dpi resolution will produce different results if one has smaller dots. Epson Stylus Photo printers are among the best in this category. But you won't see the difference unless you print on the highest-quality (and most expensive) glossy paper.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CURING YOUR WEB "ADDICTION"

Potent. Seductive. Hypnotic. An army of psychologists, led by General Dr. David Greenfield of West Harvard, CT, named these characteristics as the Internet's weapons against your fragile mind. Apparently, 16 percent of us suffer from Internet abuse, and 6 percent of that group are full-blown addicts. People who suffer from Pathological Internet Use—PIU, as it's been dubbed—lose their jobs, abuse their children, and sleep with strangers.

Bull. Self-serving. Crap. As a human being (which I assume you are), you're a social animal. In a world where more and more of our activities, lifestyles, and jobs encourage isolation, it's our instinct to find contact in any way we can. Our need for others is not a disease.

I took a survey at ABCNEWS.com, and found that I was a borderline abuser. But I'm completely cured now. Here's my program for getting over Internet addiction.

Avoid Seduction Apparently, net addiction is dangerous because it could lead to sex. Exactly how is this a problem? Sure, 50 percent of Greenfield's respondents said they lie about their age, looks, weight, or marital status when interacting on the net. But, a guy I met at a bar—time-weathered, poorly dressed, and sporting a gold ring on his left hand—tried to convince me he was a single, 35-year-old CEO. Lying is, unfortunately, part of the dating game. My advice is to be more selective in your prospects.

Move If you spend most of your time chatting with someone who is 3,000 miles away because they're the only other person who knows the theory of bisecting an angle with a compass, and you think this is a problem, I suggest you move to where they are.

Get a New Job According to the survey, the unemployed account for 42% of the afflicted. Get yourself a tech job, and watch your bad habits magically become a job description.

Get a New Wife According to Dr. Kimberly Young of the University of Pittsburgh, cybersex is one of three primary reasons that junkies jones for the web. In my opinion, unless it takes the place of realtime intimate encounters with your mate, it's not cheating. But if you're more interested in your MOD mistress than the woman in the next room, do the latter a favor and dump her, so she can get a partner who actually cares about her.

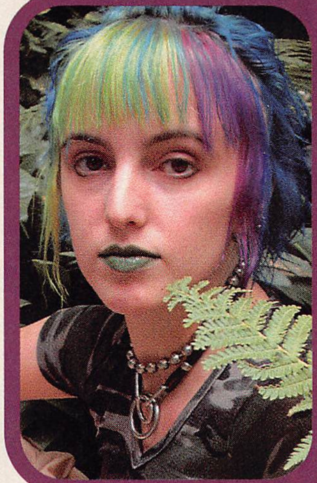
> **In a world where more and more of our activities, lifestyles, and jobs encourage isolation, it's our instinct to find contact in any way we can.**

Wait Until You're Older More bogus warning signs: The earlier you begin using the Internet, the more likely you are to get addicted, so put down your mouse and wait until technology has surpassed your ability to keep up.

Try Gambling Compulsive gambling is used as a model for PIU, but unless your home page defaults to **www.etrade.com**, this parallel hardly applies. Gamblers are antisocial and obsessed with a material wealth they'll never have; netters are social and obsessed with a wealth of outlets that are easily attainable.

Minimize the Consequences Is your time online straining your relationships, hurting your studies, or endangering your job? Congratulations! You have a bonafide problem—or you're a newbie and your so-called "addiction" will become a phase once the honeymoon is over. If this isn't the case, don't blame the net—without it, your personality would distract itself with whatever else helps you to procrastinate. Quit putting off people and projects, and learn some time management.

Get Real The main point PIU researchers miss is that, unlike television and gambling, there are real people at the receiving end of our keystrokes. Virtual communities are anything but virtual. They are real, and just as valid as any "physical" gathering place. The last, and probably hardest step in the healing process, is getting society to realize that the Internet is not a disease, but a cure for the social problems caused by the isolation of the offline world. ✸



SHERRY MONARKO has used the Internet for everything from ordering pizza to getting married. She is currently the Chief Designer for Future Networks. Contact her at **smonarko@maximumpc.com.** .

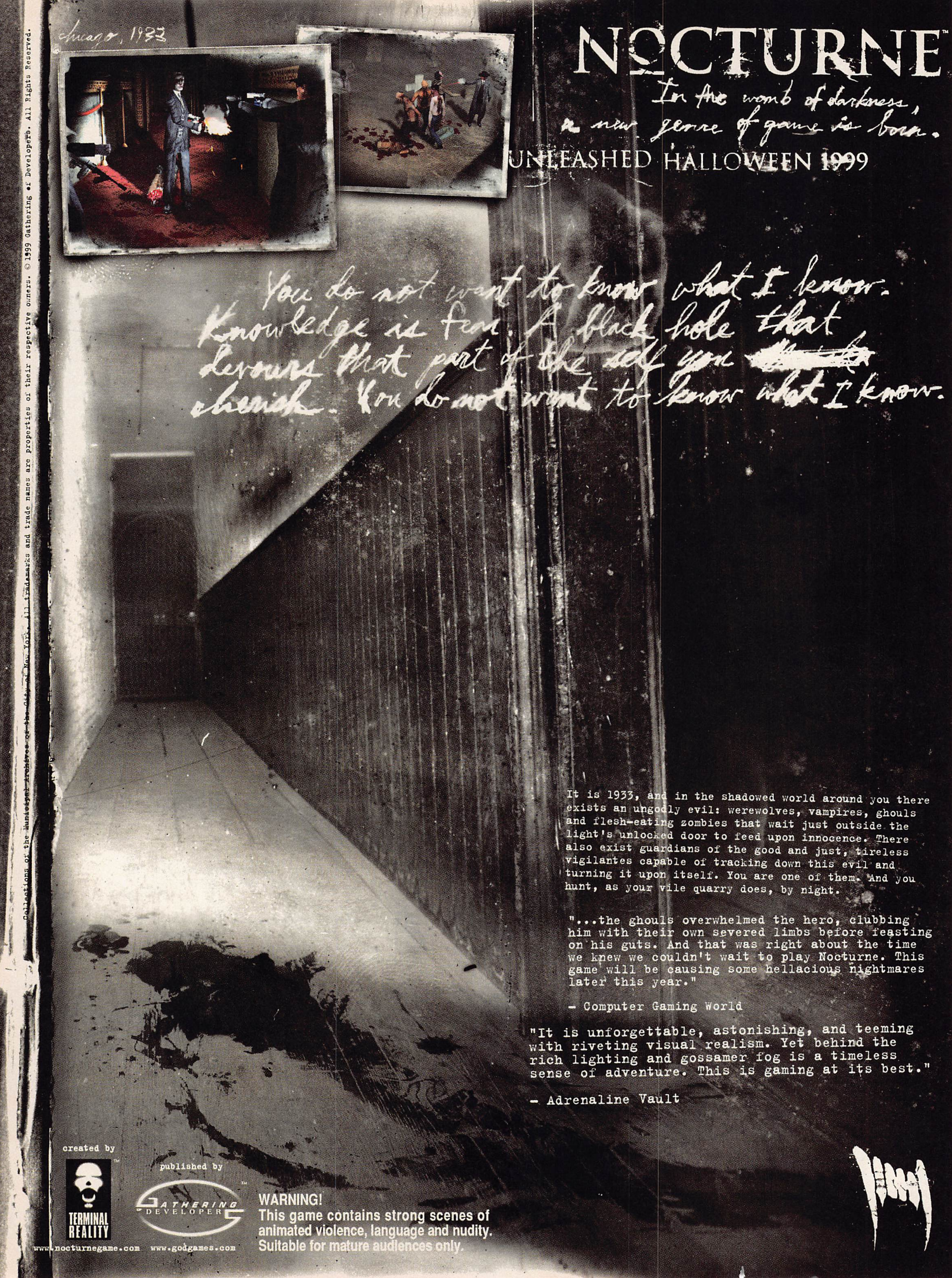
Random Thoughts

Need a Christmas gift for someone who's too special to get a gift certificate? Check these sites for something they won't forget:

▶ Archie McPhee, **www.archiemcphee.com** Purveyor of all things kitsch! From fez-wearing monkeys to the Doomsday Perpetual Calendar, Archie's products rock, and their prices are rock-bottom. There's even a section dedicated to nerds; products include the Y2K voodoo doll and liquid RAM, whatever that is. For the bad boys and girls on your list, might I suggest the cockroach lollipop?

▶ Netique, **www.netique.com** Suitable for suits or your classy auntie, Netique features such goodies as burl-wood wine stoppers, leather desk sets, bejeweled eggs, and a waterfall. They're nice, and not gaudy, I swear. Shop by price range, and read guides for picking gifts for mothers or avoiding international faux-pas. Did I mention that they do all the wrapping?

▶ Preview Travel, **www.previewtravel.com** Who doesn't want a getaway in their stocking? This site is incredibly complete and easy to navigate. It includes the usuals (booking for air travel, rental car, and hotels) and some surprises: reviews from real people (you can easily add yours), Fodor's guides, tons of useful tips, and—here's your perfect present—gift certificates. Been bad? Give them a Millennium vacation and hope Y2K doesn't send them back.



Chicago, 1933

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"...the ghouls overwhelmed the hero, clubbing him with their own severed limbs before feasting on his guts. And that was right about the time we knew we couldn't wait to play Nocturne. This game will be causing some hellacious nightmares later this year."

- Computer Gaming World

"It is unforgettable, astonishing, and teeming with riveting visual realism. Yet behind the rich lighting and gossamer fog is a timeless sense of adventure. This is gaming at its best."

- Adrenaline Vault

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▶ THE SCOOP FROM A MAJOR PLAYER

GAME THEORY

Third Person Singular

WHO WILL BE FIRST TO GET THIRD-PERSON RIGHT?

If you made it through high-school English with even the barest flicker of consciousness, the concept of "perspective" should be rattling around in your head somewhere, probably in space better used for remembering where you left your keys. Any experience has a perspective, as in the following examples:

"I fragged Bob's ass good!" (First person perspective)

"You fragged Bob's ass good!" (Second person perspective)

"He fragged Bob's ass good!" (Third person perspective)

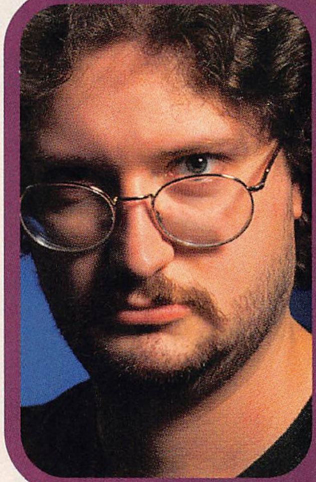
In next week's lesson, we'll discuss the reflexive pronoun…

Games are created in the first person, in which you see the world through the eyes of your game character (*Quake*), or the third person, in which you watch your character perform (*Tomb Raider*). Which perspective provides the best experience is becoming an increasingly contentious issue in the world of game design. The visceral rush of first-person that was popularized with *Wolfenstein 3D* quickly became old hat, so designers soon looked for a new way to view the game world and a character's action within it. The third-person perspective of *Prince of Persia* or *Lode Runner* is intriguing in that it combines the "live" feel of a 3D environment with the action potential of a platform game. Invoking the "over-the-shoulder" view results in even more elaborate environmental puzzles, because the player can see both the world and the figure's movement within it. Jumping puzzles, traps, levers, and other staples of the platform and side-scrolling game thus become possible.

Tomb Raider didn't pioneer third-person 3D. *Alone in the Dark*, though not the first third-person game, was the first one of any import. It was *Tomb Raider*, however, that proved the potential for this unusual perspective—namely, to demonstrate the large size of your character's boobs. Had *Tomb Raider* been a first-person-perspective game, millions of teenagers would have missed the sight of Lara Croft's absurdly rigid bust, protruding buttocks, and inflatable-sex-doll shape—and we all would have been spared three years of leering, juvenile *Tomb Raider*-philia. Of course, had *Tomb Raider* been a flop, we would also have missed *Prince of Persia 3D* and *Ultima Ascension*, games that enjoyed awesome advantages by going third-person 3D. The designers of these games may argue the integral nature of the third person in their particular game designs, but if they're honest, they'll admit that *Raider* shoved them down this weedy path.

Had Tomb Raider been a first-person-perspective game, millions of teenagers would have missed the sight of Lara Croft's absurdly rigid bust, protruding buttocks, and inflatable-sex-doll shape.

Wayne Cline, production manager for the soon-to-be-released *Indiana Jones and the Infernal Machine*, believes 3D is "the perfect genre to tell a new *Indiana Jones* tale. Obviously, when playing an Indy game, players will want to see Indy; they want to see the whip and fedora. So, for that reason, a first-person game wouldn't have worked."



T. LIAM MCDONALD is a veteran gamer and game writer. His reviews appear regularly in PC Gamer and other publications. Write him at **tmcdonald@maximumpc.com.**

But what of the notorious problems with the over-the-shoulder camera view? How many times in *Alone in the Dark*, *Tomb Raider*, or *Prince of Persia 3D* did the camera give a great view of a wall, piece of furniture, or anything *other* than the attacking enemy? *Prince of Persia 3D* handled combat smartly with a fixed low-angle view, but scuttled this success with horrendous alignment problems and cameras that frequently buried themselves in walls. The truth is, basic camera-movement routines can never really account for all the variables of a 3D environment. Without smart scripting that detects alignment problems and attempts to solve them, there will always be situations in which gamers get clobbered because they can't see an enemy, or miss a vital jump because their spatial understanding of the game's world is hobbled by a poor angle.

Cline thinks *Infernal Machine* has a solution for the floating-camera issue: "The camera stays behind Indy as in typical third-person games. If the player turns [in such a way that] the camera will go into a wall, instead of moving the camera into weird positions, we simply fade Indy out. That way the player can still see forward and still combat enemies. When Indy walks away from the wall, he fades back in."

I don't think the problems surrounding third-person cameras are insurmountable, and *Infernal Machine*'s solution may be a viable one. And, did I mention that I read something in the *Globe* this week about flying pigs and snowball fights in hell? ✸

Random Thoughts

▶ The holiday season has ushered in the Battle of the Civil Aviation sims, with *Fly!*, *Flight Unlimited III*, and *Microsoft Flight Simulator 2000* all touching down within a few months of one another. And the winner is… well, there is no clear winner. *Fly!* takes honors for cockpits and instruments, *FU3* wins for scenery and weather, and *MSF2K* gets kudos for a broad palette of features and airports.

▶ *MechCommander Gold* is my pick for reissue of the season. If you missed this mech RTS game the first time around (in its admittedly flawed first released), don't pass up the chance to pick it up now, especially since it should be available for cheap.

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1352 Kbps for 1X DVD-ROM Drives. [3] ITU V.90 modems are designed only to allow faster downloads from K56flex- or V.90-compliant digital sources. Maximum achievable download transmission rates are currently unknown, may not reach 56 kilobits per second (Kbps), and will vary with line conditions. [4] 24X Max CD-ROM data transfer rates may vary from 1500 to 3600 Kbps. One year parts and labor. Labor for notebook systems is pick-up service. Compaq, the Compaq Logo, and Presario are registered in the U.S. Patent and Trademark Office. Microsoft® Windows®98 installed. Microsoft, MS, and Windows are registered trademarks of Microsoft Corporation. Intel, the Intel Inside Logo, and Pentium are registered trademarks and Celeron is a trademark of Intel Corporation. Product and company names mentioned herein may be trademarks and/or registered trademarks of other companies. Call Compaq Monday–Friday, 7:00am–11:00pm (CT).

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HARD DRIVES | DIGITAL CAMERAS | NOTEBOOKS | CD-Rs | VIDEOCARDS | NETW

MAXIMUM PC
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PHOTOGRAPH BY JACK HUTCHESON

COOLING DEVICES | SOUNDCARDS | SPEAKERS | PDAS | MP3 PLAYERS | GAMES |

KING KITS | DVD DRIVES | REMOVABLE STORAGE | MOTHERBOARDS | PRINTERS

our editors pick the best products of 1999

gear of the year 1999

The concept is simple: For 364 days out of every yearly publishing cycle, the Maximum PC Testing Team plays with the coolest PC components available to mankind. Then, on the 365th day, we name the very best parts available in each product category. Herein are the winners of our 1999 Gear of the Year awards.

This year, you'll notice the omission of the CD-ROM drive category. We simply feel that CD-ROM drives are irrelevant in this age of superfast CD burners and multi-talented DVD-ROM drive kits. Meanwhile, portable MP3 players have come into vogue, so we added this category to our awards list. Rest assured that we brutally tested each and every product that won an award. Check our online reviews database at **www.maximumpcmag.com** for each product's original evaluation; products that haven't yet been reviewed will soon appear in the magazine.

In keeping with tradition, each Maximum PC editor describes the best products that were launched in his respective technology beats. Sadly missing from this year's editorial roll call is senior editor Andrew Sanchez, who departed to the great lab in the sky in February. A truly unique wordsmith, our erstwhile videocard expert could turn a phrase like no other human being—we honor him here with our favorite Andrewisms. And god have mercy on our wretched souls if he doesn't approve of our awards choices!

And with that, we give you the Gear of the Year...

STEMS | CPUS | VIDEO CAMERAS | HARD DRIVES | DIGITAL CAMERAS | MOTHE

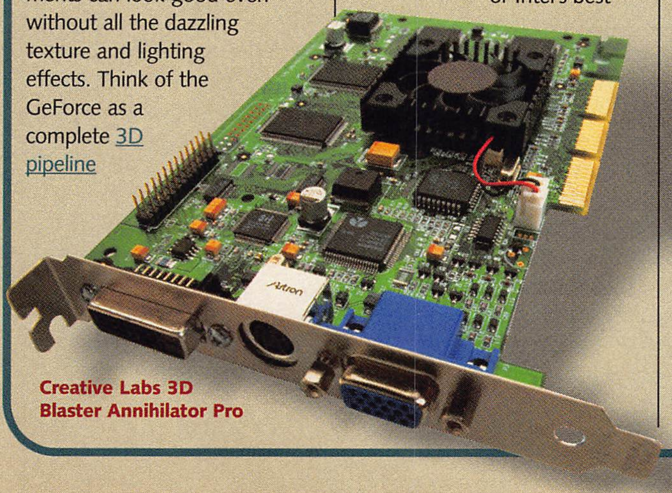
Sean Downey

Gig: Departments Editor
Home System: 500MHz Pentium III, ATI All-in-Wonder 128, nVidia TNT2 PCI reference board, Sony TV set and Princeton DPP-500 digital flat panel, 9GB IBM Ultra2 SCSI and 22GB IBM Ultra/66 hard drive.
Who would play him in the movie? Vincent D'Onofrio
Game he'd create: A parking lot combat sim in which you search for the perfect spot while battling slow-moving minivans and dodging children selling candy. Self-mutilation to get the handicapped spot is not allowed.
Favorite Andrew Sanchez expression: "Zoinks, it's the Miner 49er!"

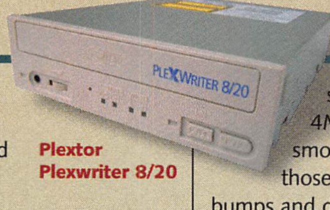
▶ Best Videocard:

Creative Labs 3D Blaster Annihilator Pro

Forget S3's texture compression, Matrox's bump-mapping, 3dfx's T-buffer, and all the other fancy makeup that's caked onto the graphics flowing from the current breed of 3D game accelerators. The real looker this year is nVidia's GeForce 256 chipset. Built to augment both fill rate and triangle rate, nVidia's new graphics processor is capable of pushing 15 million triangles per second, resulting in higher polygon count models that don't need the extra cosmetics. In other words, 3D environments can look good even without all the dazzling texture and lighting effects. Think of the GeForce as a complete 3D pipeline makeover in one tidy little silicon package. The GeForce chipset is capable of assuming many of the CPU's polygon and lighting set-up duties, accelerating the transform and lighting stages in a way that the CPU never could. The book on the GeForce says it can handle geometry transform-and-lighting calculations at four times the triangle rate of AMD or Intel's best CPUs.



Creative Labs 3D Blaster Annihilator Pro

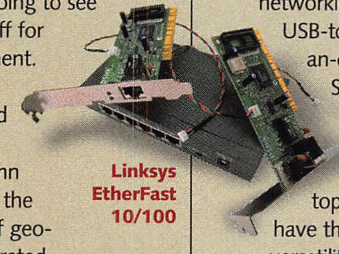


Plextor Plexwriter 8/20

While nVidia should be commended for producing the first graphics processor to accelerate the entire 3D pipeline, every 3D chipmaker has plans to undergo the same makeover. By this time next year, every new videocard will sport geometry acceleration, so the marriage of a lame CPU and a GeForce 256 card will mean renewed vitality for peeps with older systems.

The GeForce is no slouch when it comes to old-fashioned effects rendering. In addition to adding a transform engine, a lighting engine, and an HDTV processor, nVidia expanded the two-pixel pipeline of the TNT2 setup-and-rendering engine by two pixel pipelines. The quad-pixel GeForce rendering engine is the fastest mofo around.

It's tempting to rush out and buy a GeForce card, but you may want to wait until the prices drop or until AGP 4x systems become available. If you're buying a GeForce card to play last year's games, you're not going to see a huge payoff for your investment. But if you're buying ahead of the curve, you'll be damn happy when the floodgates of geometry-accelerated games open. For the early adopter with deep pockets, Creative Labs Annihilator Pro is the card to get. Loaded with 32MB of DDR RAM and backed by Creative's reputation for cutting-edge driver innovations, the Annihilator Pro is the balls-out best of the pack. *Receives a 9/Kick Ass in this issue, $300, www.creaf.com.*



Linksys EtherFast 10/100

▶ Best CD-R

Plextor PlexWriter 8/20

Plextor's PlexWriter 8/20 is the most feature-packed CD recorder we got our grubby little hands on this year. It's equipped with an advanced spindle-motor suspension system, and its 4MB buffer smoothes out all those nasty speed bumps and data-access irregularities that can result in buffer underruns. And the PlexWriter is bitchin' fast.

Plextor sweetens the deal with top-notch recording software, including Adaptec's *Easy CD Creator* and *DirectCD*, and *CDResQ*, which backs up your hard drive onto a bootable CD, making system restoration a painless process. Perhaps the coolest software in the bundle is Plextor's own *PlexManager*, which includes several unique digital audio-extraction utilities, and a bit-by-bit-accurate disc-duplication utility. *Received a 10/Kick Ass in May 1999, $370, www.plextor.com.*

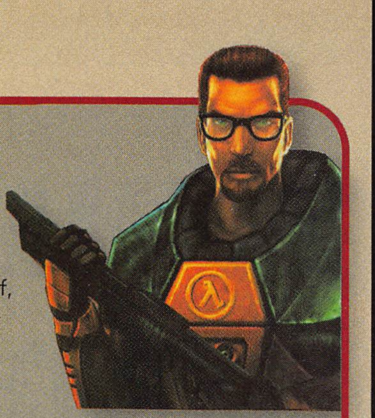
▶ Best Networking Kit

Linksys EtherFast 10/100

Home networking made a rocky landing this year, as companies rushed to connect your PCs with all sorts of freaky new topologies: wireless networking, phoneline networking, powerline networking, USB-to-USB networking, and even USB-to-Ethernet-with-an-excursion-to-Saskatchewan networking. While innovative, the new topologies just don't have the raw speed and versatility of 10/100 Ethernet. Of course, the new technologies haven't had 25 years to refine themselves, either.

If you're keen on punching holes in your wall and wiring your home with CAT5 cabling, use the Linksys EtherFast 10/100 networking kit. It handles full-duplex transmissions and mixes 10/100 topologies with aplomb. And it comes with an unlimited-user version of Acotec's *Internet LanBridge* modem-sharing software, so you can share out that new broadband line with the entire household. *Received a 9/Kick Ass in August 1999, $140, www.linksys.com.*

game of the year



Half-Life Anyone who doesn't agree with our decision to choose *Half-Life* must never have never stalked the halls of Black Mesa Complex. *Half-Life* is engrossing for folks who regularly abhor single-player first-person shooters, and redefines what any game could and should be.

You'll never find a better integration of environment and storyline. The developers at Valve offer a completely self-contained, self-referential playing world, then drop you right in the middle of it to play out an equally brilliant plot. The game slowly unfolds through stunning scripted sequences, and unbelievable traps—we especially like the point at which you're captured by the Marines and stripped of your weapons halfway through the game.

By employing the credo that anticipation of danger is always worse than danger itself, Valve delivers fear and trepidation not seen on the PC since *Doom*. Thankfully, Valve made *Half-Life* multiplayer action as thrilling as the single-player experience: The free *Team Fortress Classic* dominates every other team-based game ever made. Editor emeritus Andrew Sanchez said it best: "*Half-Life* is as close to perfection as you'll ever see." *Received a 10/Kick-Ass in Feb. 99, $55, www.sierrastudios.com*

JOSH norem

Gig: Associate Editor
Home system: 550MHz Pentium III, TNT2 Ultra, 20-inch Sony, 1.5Mbps PacBell DSL, two Cambridge SoundWorks PC Works speaker sets running out of dual-outs on Diamond MX300 soundcard
Vehicle of choice: 1998 Honda CBR 600 F3 (it's a donor cycle)
Who would play him in the movie? Anthony Michael Hall
Celebrity he'd most like to boink: Joan Jett
Favorite Andrew Sanchez expression: "This game has no honor."

▶ Best DVD Kit

Pioneer 10x DVD-114

The 10x DVD kits from Hi-Val and Utobia are easily the "Mothers of all DVD," with all the little 6x and 8x kits scrambling below like puppies fighting for a teat. The kits' heart and soul, the Pioneer DVD-114, is da bomb, and at an average lab-tested speed of 5.6x, it's the fastest DVD-ROM we've ever benchmarked. It's lab-tested CD-ROM rating of 23x means it's fast enough to replace that aging cup holder you've got, and for burning CDs, it rips MP3s faster than you can say "copyright-protected."

Both kits bundle versions of the Hollywood+ card from Sigma Designs, making the deal even sweeter (Hi-Val's offers slightly better image quality on a monitor). For theater-quality Dolby Digital 5.1 surround-sound and pristine image quality, hardware MPEG-2 decoding is the only way to watch DVDs on your PC, and no other card handles blockbuster action flicks like the Hollywood+. The only thing this card doesn't do is produce popcorn—but we hear that Sigma is hard at work on including popcorn-out in the next revision. *Both kits received a 9/Kick Ass in November 1999; Hi-Val: $200, www.hival.com; Utobia: $179, www.utobia.com.*

Castlewood Orb

▶ Best Portable Storage:

Castlewood Orb

How doth the Castlewood Orb kicketh ass? Let me count the ways. It's nearly twice as fast as its main competitor, Iomega's ubiquitous yet slow-as-a-Yugo Jaz drive. Sure, the Jaz is the standard these days, and it's great if you need to tote disks around to various machines, but the Jaz is just too slow to satiate our lust for raw PC power. The Orb, however, reaches speeds akin to a hard drive, thanks to its magneto-resistive (MR) head technology developed by IBM. Its read/write speeds of 9.4/8.7 MB/sec smoke the Jaz's pokey 5.4/1.1MB/sec scores, and its burst rates are almost twice as fast. All that speed won't put a pinch on your pocketbook: The Orb costs $150 less than the Jaz, and its media costs only $30 per disk, compared to the outlandish $125 per disk requested by Iomega. The Orb also holds more data—2.2GB per disk!

Pioneer 10X DVD-114

The Orb's only glitch is its rather small user base, which makes compatibility an issue for a lot of people. We understand that concern, but are optimistic that before long, the masses will catch on to the Orb as a removable storage medium that isn't slow or expensive. *Received a 9/Kick Ass in September 1999, $200, www.castlewood.com*

PRODUCT PHOTOGRAPHY BY AARON LAUER

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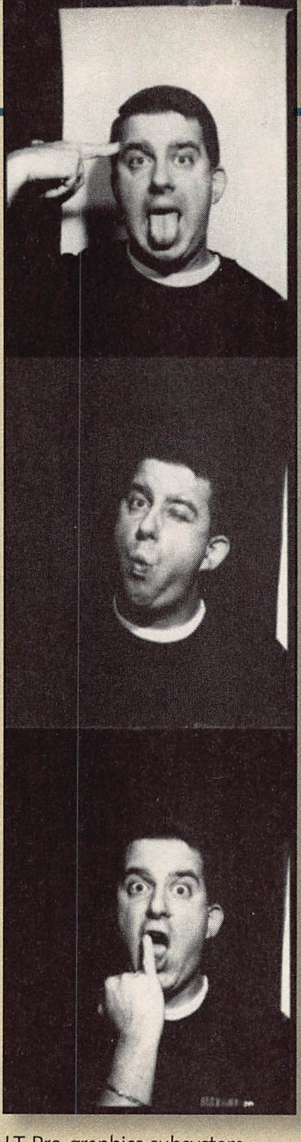
COMMAND & CONQUER HAS ARRIVED!

Bryan Del Rizzo

Gig: Senior Editor
Home System: 700MHz Athlon, ATI Rage Pro/Voodoo2, 21-inch Sony, @Home cable broadband
Last device overclocked: Shower head
Who would play him in the movie? Wilmer Valderrama
Celebrity he'd most like to boink: Janeane Garafolo
Favorite Andrew Sanchez expression: "Pixel-pumping, polygon-pushing performance."



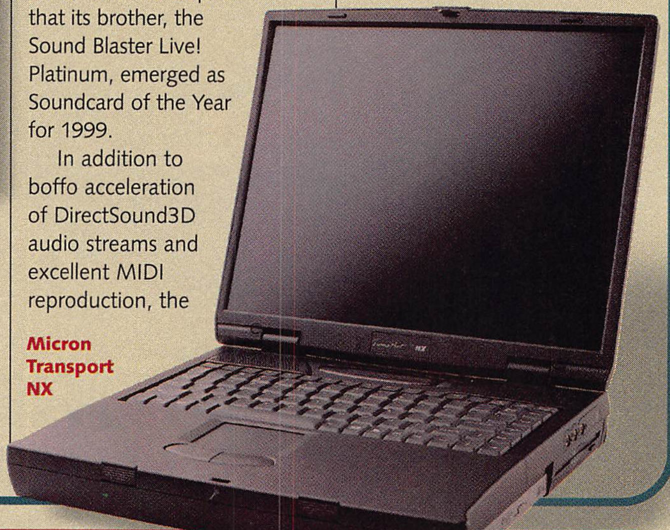
► Best Notebook

Micron TransPort NX

We should tell you that we loved Sony's slim-line PictureBook, which incorporates a way-cool "motion eye" camera and 23 special effects that can be applied in realtime to the camera images. We also grooved on Quantex's I-1410, a brawny bruiser that proved powerful enough to go toe-to-toe with the desktop camp. But when Micron's heavyweight TransPort NX stepped into the ring, it KO'd the competition with the time-tested combo of power and design ingenuity.

The NX's 366MHz mobile Pentium II—complemented by 128MB of SDRAM—pummeled our *SYSmark* Windows apps benchmark, and the 8MB Rage LT Pro graphics subsystem stunned the crowd by making *GLQuake* succumb to an astonishing 24fps at 640x480.

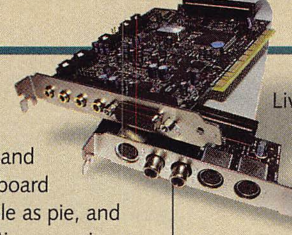
Beyond basic performance, the TransPort NX triumphs with innovative flip-up panels that provide access to otherwise off-limits components. Swapping out parts is as easy as lifting a couple of tabs and sliding the keyboard forward—simple as pie, and pure genius. Micron engineers also had the foresight to integrate a Mini PCI port, a new interface that accepts small formfactor devices such as modem, Ethernet, and global positioning system cards, fostering all sorts of forward compatibility. For all these upgrading opportunities, we'd gladly have compromised a little bit of power—but the TransPort NX is a no-compromise notebook. *Received a 10/Kick Ass in June 1999, $3,600, www.micronpc.com.*



Micron Transport NX

► Best Soundcard

Sound Blaster Live! Platinum



Sound Blaster Live! Platinum

The original Live! received a 10 rating in the October 1998 issue, so it's no surprise that its brother, the Sound Blaster Live! Platinum, emerged as Soundcard of the Year for 1999.

In addition to boffo acceleration of DirectSound3D audio streams and excellent MIDI reproduction, the Live! Platinum comes with a secondary interface that installs in a front-of-case drive bay. The interface allows you to quickly connect digital and analog audio components through its myriad ports, including digital S/PDIF-ins and S/PDIF-outs. As if that wasn't enough, the Platinum also includes the most robust software bundle for a soundcard that we've seen all year. In addition to full retail versions of *Descent III*, *Need For Speed 4*, and *Thief: The Dark Project*, the bundle includes an assortment of music-related applications.

Frankly, we can't wait to see what Creative does next year with the awesome Live! series. *To be officially reviewed in 2000, $200, www.soundblaster.com*

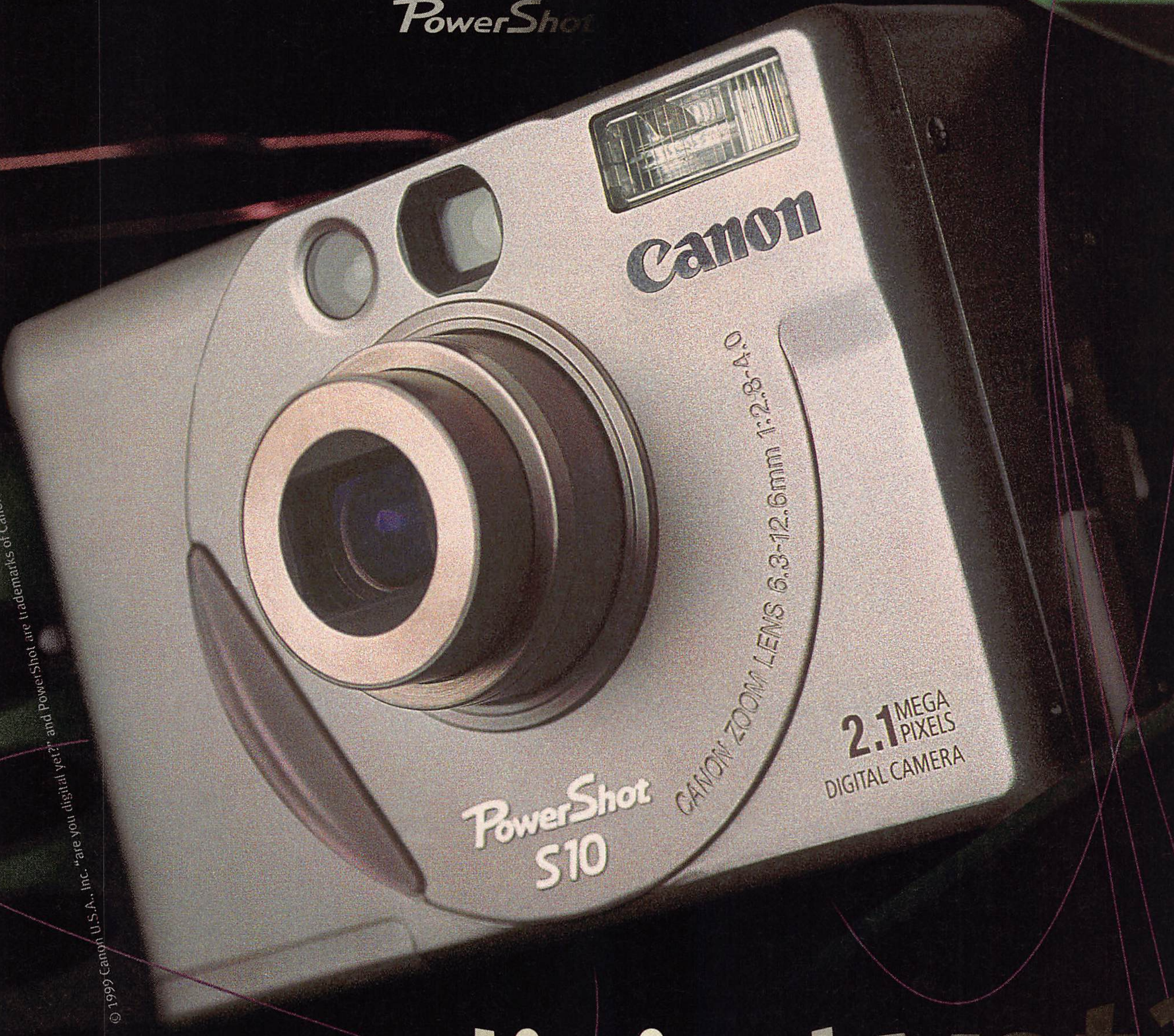
news of the year

Here it is, the past 365 days in review, in chronological order, as defined by *Maximum PC* headlines. Go to **www.maximumpcmag.com** for our daily news updates.

AOL Buys Netscape • **Rendition Kills RRedline Chip** • SyQuest Goes Bankrupt • **3dfx Buys STB** • Palm Announces First Wireless PDA • **Privacy Groups Boycott Pentium III** • iMac Tops Sales Charts • **S3 Kills ViRGE Line** • AMD Outsells Intel on Low-End Direct Rambus Delayed • **Lycos Launches MP3 Search Tool** • Melissa Virus Spreads Like Wildfire • **Super Hacker Kevin Mitnick Pleads Guilty** • Iomega Erases Tape Drive Biz • **K7 Cooled to 1GHz** • Chernobyl Virus Hits Hard • **Creative Labs Jumps Into MP3 Market** • Microsoft Forms Linux Swat Team • **Voodoo^3 Card Tops at Retail** • Metabyte Bails on 3D Biz • **National Semi Unloads Cyrix** • RIAA Backs Non-MP3 Standard• **Federal Web Sites Attacked by Hackers** • S3 Buys Diamond • **Divx Dies a Quick Death** • Linux Outsells Win98 in Japan • **AMD's Atiq Raza Leaves Company** • Clinton Eases Tech Export Limits • **Emulator Company Beats Sony Lawsuit** • Hercules Shuts Doors • **Thrustmaster Bails On Joystick Biz** • VIA Gobbles Up WinChip And Cyrix • **Athlon Outperforms Pentium III** • Intel Delays 820 Chipset Indefinitely • **Gateway Dumps AMD CPUs** • Apple Renegs on G4 Offer • **IBM Bails On Retail Market** • 3dfx CEO Greg Ballard Resigns • **Real 3D Shuts Down For Good**

There's digital. And then there is Digital. The standard in optics meets on-the-edge technology Digital. The biggest name in cameras on the smallest package Digital. Extreme Digital. Canon PowerShot Digital. Visit our website to see just how far digital has come.

PowerShot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CANON ZOOM LENS 6.3-12.6mm 1:2.8-4.0
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Rick Popko

Gig: Reviews Editor
Home System: 600MHz Pentium III, TNT2 Ultra, DirecPC satellite broadband, Pinnacle Systems DV300 FireWire video-capture board
Who would play him in the movie? William H. Macy
Game he'd create: *The Imaginators*, a third-person adventure about three children whose imaginations have run wild. One talks to animals, one walks on walls and ceilings, and one draws doors on walls and walks through them.
Favorite Andrew Sanchez expression: "Sucks to be you!"

▶ Best Speakers

Klipsch ProMedia v.2-400

The decision boiled down to two finalists: the five-piece Klipsch ProMedia 4.1 set and the six-piece Cambridge SoundWorks Desktop Theater 5.1 set. The ProMedias could be cranked so loud, we had to cover our ears while playing the *Unreal Tournament* demo at full bore. The Desktop 5.1s, on the other hand, knocked us into the back of the lab while playing the special effects-laden *Matrix* DVD. The main question for us came down to, What are we going to be using these speakers for most often—playing games and listening to music, or watching movies?

IBM UltraStar 9LZX

With that, the vote landed on the ProMedias. This Dolby 4.1 setup is THX-certified, pumping out an astounding 400W total of eardrum-bleeding power. Each of the four 60W satellites is packed with a 3-inch horn and a .75-inch polymer dome tweeter, delivering a solid midrange to roughly 40Hz before audibly crossing over to the subwoofer. The 6.5-inch, dual-side-firing sub drivers delivered earth-shaking bass all the way down to 20Hz, with some farting occurring at around 31.5Hz. The whole set-up is extremely well-built and aggressively priced. If you want arrogantly loud quad-channel sound without distortion, you can't go wrong with the ProMedias. *To be officially reviewed in 2000, $249, www.klipsch.com*

▶ Best Hard Drive

IBM UltraStar 9LZX

Because UDMA hard drives are so fast these days, people question the need for SCSI drives at all. The fact is, SCSI drives offers faster spindle speeds and a host of other features that are de rigueur for hardcore workstation/server folk who require the ultimate-ultimate in order to simply get their work done.

On that note, the best SCSI drive of the year is IBM's 9.1GB UltraStar 9LZX. Its specs include a freaky-fat 4MB data buffer, Multi-Threading capabilities, Command Tag Queuing, S.M.A.R.T. drive technology, Predictive Failure Analysis, and Connect/Disconnect. In other words, this drive is smart enough to suss out problems before they occur.

Sony TRV-103

The damage for this Ultra2 drive is $625, but you get what you pay for. The UltraStar spins at 10,000 rpm, and in lab testing it reached bursts of 58MB/sec, smoking the competing Ultra2 drives from Western Digital and Seagate. Ultra2 SCSI drives aren't for everybody. They're for the pure PC power perfectionist. *Received a 9/Kick Ass in March 1999, $625, www.storage.ibm.com.*

▶ Best DV item

Sony TRV-103

Sony's TRV-103 is the most innovative consumer video camera to appear since Sony launched the shoulder-mounted Betamax back in the early 80s. This time out, Sony's taken the shell from its Hi8 Handycams and updated the internal components; the camera now records the video signal digitally to 8mm tapes, eschewing analog altogether. The digital interface lets you stray up to 15 generations from your original master before there's a noticeable degradation in picture quality. Even better, the TRV-103 plays back standard 8mm and Hi8 tapes. But there are three features that put this camera over the top: It comes with a IEEE1394 port, has a built-in analog-to-digital video converter, and boasts a NightShot that works so well, you could actually use the camera as a night-vision goggle. *Received a 9/Kick Ass in August 1999, $889, www.sel.sony.com*

Kodak DC260

▶ Best Digital Camera

Kodak DC260

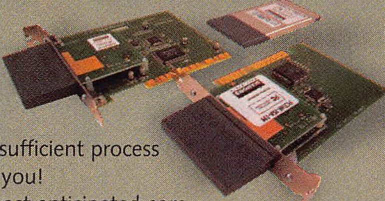
With stellar 1536x1024 resolution and a 1.6-megapixel CCD, Kodak's speedy DC260 snaps some of the best images we've ever pulled out of a digital still camera. Colors were the most accurate we've seen in a consumer-grade camera, and artifacting was only visible under extreme magnification.

Speed freaks will appreciate the USB adapter that downloads images from the DC260 to your computer 10 times faster than the antiquated serial port method used by most digital cameras. Control freaks will dig the ability to program macros into the camera, letting you automate specific camera settings, export your images into HTML pages, and create animated images in the camera, all at the touch of a button. *Received a 10/Kick Ass in November 1998 (and is still the best camera available), $1,000, www.kodak.com*

FLOPS OF THE YEAR

The following product and technology launches were either wholly underwhelming or thoroughly atrocious.

- **AGP 4x**: The latest AGP iteration will give you bragging rights—but will it ever make a difference in your game?
- **ATI TV Wonder**: We're still waiting to see if ATI has fixed the card's broken drivers. Stay tuned.
- **Diamond Home Free Wireless**: Weak transmission signals rendered this networking kit essentially useless.
- **Divx**: What free-spirited American would ever pay for such a scheme? Once we buy a movie, we want to *own* that movie.
- **Free PCs**: "We'll give you a crappy a PC if you promise to look at our ad banners." Bah!
- **G4 500MHz**: Apple learned the pain of an insufficient process technology. No 500s for you!
- **Intel 820**: The year's most anticipated core-logic chipset was aborted on the launch pad. 'Nuff said.
- **Matrox OpenGL support**: It takes a year to offer GL support for the G200? And *Quake II* players were to be using the G200 for what purpose, exactly?
- **Savage 4**: Among a field of faster competitors, S3's latest just screamed "Ignore me!"—especially given the complete lack of S3 Texture-Compression games.



Home Free Clueless Networking

Kenn Durrence

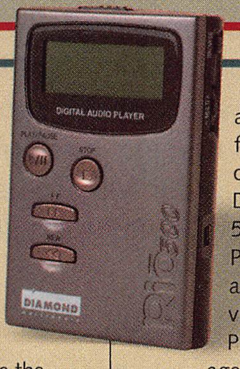
Gig: Maximum CD Editor
Home System: 600MHz Pentium III, TNT2 Ultra, 19-inch Hitachi, 384Mbps PacBell DSL
Ride: 1999 Ford Mustang GT
Who would play him in the movie? Rocky "The Rock" Maivia
Celebrity he'd most like to boink: Salma Hayek
Favorite Andrew Sanchez expression: "Step the feck off!"

► Best PDA

Palm VII

The latest Palm includes a revolutionary feature that all PDAs should offer: wireless Internet connectivity. Use the Palm VII to send and receive e-mail and read web content anywhere within service range. Using a small built-in transmitter, the Palm VII receives "clipped" web pages—hardly the full HTML experience, but it's more than adequate for reading the news, purchasing airline tickets, and buying and selling stocks. Any web-content provider can serve clipped pages; all it takes is a miniscule server application.

From a basic design standpoint, the Palm still rules for its elegant ease-of-use. The Palm OS is a snap to learn and easy to navigate. The Graffiti "power-writing" software is still the best way to enter data into any PDA, and the upgraded monochrome backlit display is now easier to read in poorly lit conditions. Most importantly, the Palm family kicks buttocks for its vast library of third-party software—more than 4,000 thin apps, games, and utilities are available for the devices. Windows CE devices offer only a handful of applications, and as an OS, Windows CE has boggy memory requirements. We love the Palm VII! We're just hope the next Palm improves upon the 2MB of storage currently available—we need more room to store all those cool apps. *Received a 9 in August 99, $600 plus $10-to-$25 monthly for net access, www.palm.com*



Diamond Rio 500

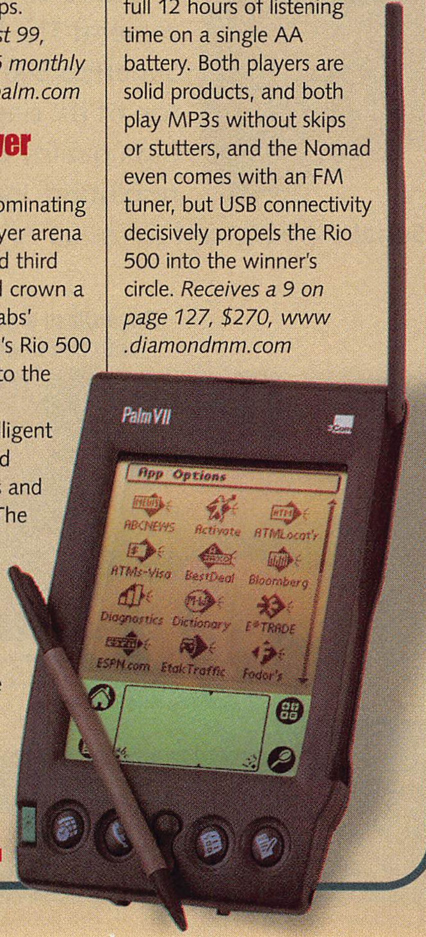
► Best MP3 Player

Diamond Rio 500

Both heavyweights dominating the portable MP3 player arena demanded second and third looks before we could crown a champion. Creative Labs' Nomad and Diamond's Rio 500 were clearly superior to the competition; both are compact, feature intelligent button placement, and offer scrolling playlists and viewable song titles. The Rio, however, wins our Gear of the Year, based on its extra-special design decisions.

Not only does the Rio break new ground by offering a backlit display, but it's also the first portable player to answer our cries for USB connectivity. Downloading a 5.2MB song from PC to player took a mere 9.5 seconds via USB. The Rio's PC-side music management interface is also more intuitive than the Nomad's, which was clunky and prone to system hangs.

The Rio 500 supports a full 12 hours of listening time on a single AA battery. Both players are solid products, and both play MP3s without skips or stutters, and the Nomad even comes with an FM tuner, but USB connectivity decisively propels the Rio 500 into the winner's circle. *Receives a 9 on page 127, $270, www.diamondmm.com*



3Com Palm VII

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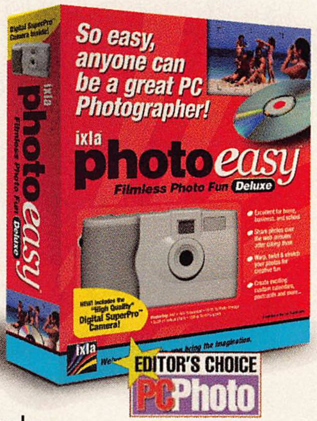
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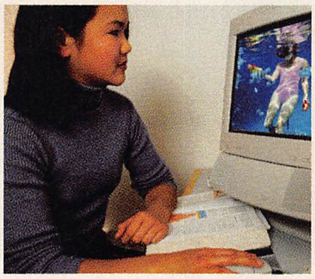

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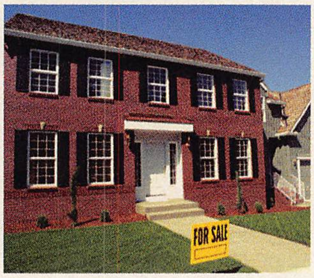

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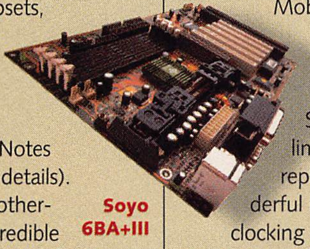
gordon mah ung

Gig: News Editor
Home System: Dual 400MHz Pentium II, Voodoo^3 3000, 19-inch Mitsubishi flat-screen, 10GB Seagate Ultra2 SCSI drive, dual-booting Win2000 beta and Win98
Last device overclocked: Oster five-speed blender pushed two bins to Frappe
Who would play him in the movie? Chow Yun-Fat
Celebrity he'd most like to boink: Gillian Anderson (when she's in Agent Sculley mode)
Game he'd create: *Sim Sim*, a realtime strategy game that simulates a simulator
Favorite Andrew Sanchez expression: "Bah!"

▶ Best Motherboard

SOYO 6BA+III

These are treacherous times for motherboard aficionados. Athlon mobos are nearly impossible to find, so true motherboard variety is available only to Intel loyalists. If you fall in this camp, should you opt for new-fangled features such as AGP 4x, PC133, or Direct RDRAM? Right here, right now, our answer is nyet. After being thoroughly disappointed last month by the Intel 820 and VIA VC133 chipsets, we say that the Intel 440BX is still the champ (check out our November Lab Notes department for details).



Soyo 6BA+III

BX-based motherboards offer incredible reliability, native Win98 driver support, and Linux and BeOS compatibility. Plus, BX mobo prices should be better than ever, now that other chipsets have "eclipsed" the venerable Intel warhorse. Will Slot 1 muddas run with the upcoming Coppermine CPUs? Yes. In fact, some motherboard makers have already produced patches to support Intel's 0.18-micron CPU. Intel may simply have made the BX so robust and stable, it's not worth upgrading to the newer, potentially buggier technology.

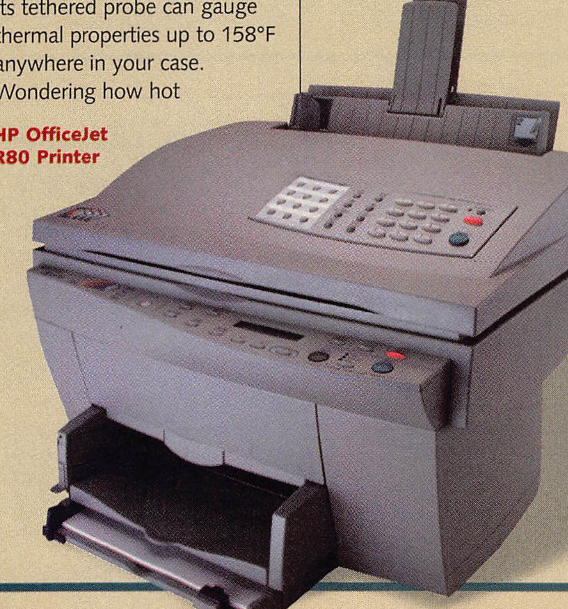
And so, we're calling the BX-based Soyo SY-6BA+III our Mobo of the Year. Like a small-block Ford Mustang, the SY-6BA+III is limber and fast, replete with wonderful BIOS and overclocking options. If you're prudently waiting for the chipset wars to settle down before upgrading, the SY-6BA+III is your hot mama. *Received a 9 verdict in October 1999, $105, www.soyo.com*

▶ Best Multi-Function Printer

HP OfficeJet R80

In our March office equipment round-up, we gushed nothing but love for Hewlett Packard's 1175Cse, and have been hoping that HP would update the bomb-diggity printer/scanner/fax. HP's R80 does indeed eclipse the 1175Cse, offering 600x600 dpi color printing, 600x2400 30-bit scanning, and, in a key improvement, dedicated faxing—with the 1175Cse, you had to rely on your PC's fax modem to send documents, while the R80 includes a dedicated fax module and keypad that allows direct faxing even when the PC is turned off.

Because the R80 is actually cheaper than the 1175Cse, there's no reason not to buy one if you're looking for the best small-office printer available. *To be reviewed in 2000, $800, http://www.hp.com/all-in-one*



HP OfficeJet R80 Printer

▶ Best Cooling Devices

Oregon Scientific's Jumbo Thermometer/PC Power & Cooling Deluxe Tower Case

It wasn't specifically made for use in PCs, but Oregon Scientific's Jumbo Thermometer is still an invaluable tool for checking system temperatures. Its tethered probe can gauge thermal properties up to 158°F anywhere in your case. Wondering how hot your chipset is running? Tape the thermometer to it and stand back. The Jumbo can simultaneously display, in large LCD numbers, both your room temperature and case temperature. It also records highs and lows, then recalls them at a button-touch.

PC Power & Cooling Deluxe Tower

Expect to see fiendishly brutal *Maximum PC* case reviews in 2000, but for now, rest assured that you won't find finer case construction than PC Power & Cooling's chrome wonder.

Though we give props to Super Micro's SC760-A—a variation of the Addtronics case we selected for Dream Machine 98—PC Power & Cooling's Deluxe Tower supports redundant power supplies and has 10 external drive bays of the 5.25-inch persuasion. And perhaps best of all, the chrome-and-blue wonder is strong enough to support any full-grown man who wants to ride around the room on its casters. Try that with your pot-metal case, son. *Jumbo thermometer, $25, www.heartlanddirect.com; Tower case, $449, www.pcpowercooling.com*

JON PHILLIPS

Gig: Editor-in-Chief

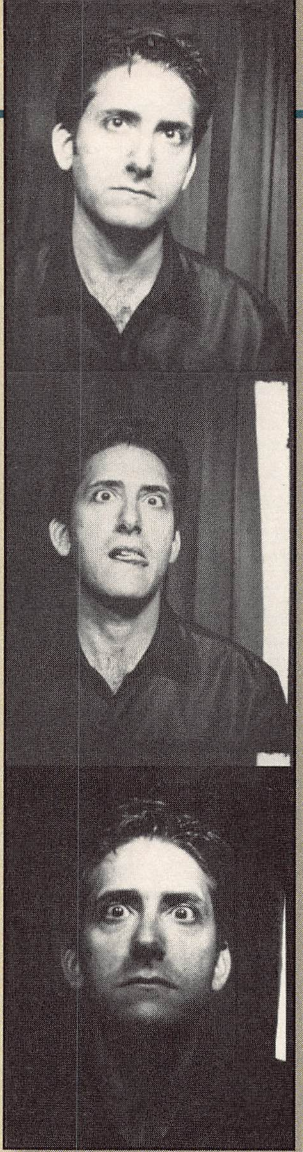
Home System: 500MHz Pentium III, TNT2, 1.5Mbps Covad DSL

Who would play him in the movie? John Cusack

Celebrity he'd most like to boink: Liv Tyler and/or Garcelle Beauvais

Game he'd create: *Muay Thai Fighter*, a true Thai kickboxing sim in which you must earn training points before you're allowed to fight.

Favorite Andrew Sanchez expression: "Bright lights, big SCSI!"



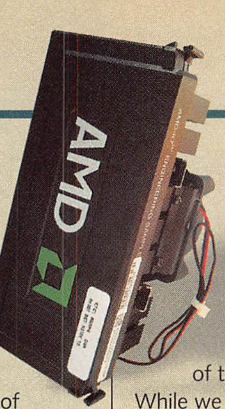
▶ Best CPU

AMD Athlon

Intel loyalists will scoff at our decision to name the Athlon our CPU of the Year, but we couldn't ignore the spry Athy's ambitious superpipelining strategies that propel the processor to ever-faster clock speeds. Fact is, at a 0.25-micron process, the Athlon can scale to faster clocks than a Pentium III of the same fab width; this is why Athlons have outpaced P-IIIs since September.

Both CPU families are segueing to 0.18-micron processes, and it will be interesting to see whether Intel continues to lag behind AMD on the sheer core frequency tip. In fact, it will be even more interesting to see how Pentium III Coppermines will perform with 256K of on-die, full-speed L2 cache; faster L2 might put Intel back on top. But for now, the Athlon gets the blue ribbon for simply offering a brave new vision that's backed up by real-world performance superiority.

In case you're not hip to the Athlon's bag of tricks, let us introduce you to its 128K of L1 cache (the P-III has just 32K); three floating-point units (the P-III has just two); and 200MHz direct channel to system memory (Intel's official system bus currently tops out at 100MHz). These three ingredients help the Athlon outperform a P-III of the same clock speed in most applications that aren't written directly for Intel's SSE instructions. The Athlon has anchored the fastest systems we've seen this year, so awarding the CPU our highest honor is a no-brainer. *First featured in the September 99 issue, prices vary according to speed, www.amd.com*



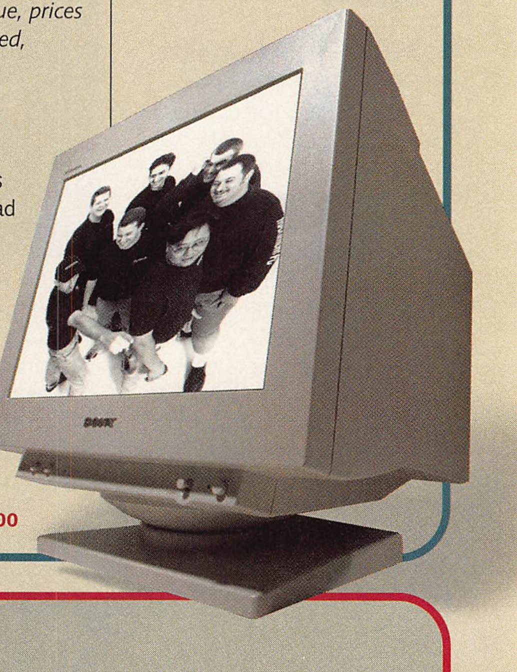
AMD Athlon

▶ Best Monitor

Sony GDM-F500

We had some prereqs for best monitor: It had to be 21 inches or larger, have a virtually flat screen, and offer all the brightness and color purity of aperture grille technology. Small, bulbous, mottled shadow-mask CRTs are strictly *minimum PC.*

Our criteria weeded out all but two displays, the Sony F500 and Mitsubishi 2020u (the F500 won Gear of the Year in 1998). While we haven't yet reviewed the 2020u, we have tested it in the lab—it's a stunning display that actually boasts slightly less geometric distortion in the corners than our F500 review unit. But while its control set is as extensive as the F500 the 2020u's variable 0.25-0.27mm grille pitch doesn't match the F500 unprecedented 0.22mm pitch. The F500 thus wins for a *second* year in a row—but not by much. Both displays will drop your jaws. *Received a 10/Kick-Ass in August 1999, $1,900, www.sel.sony.com* ✹



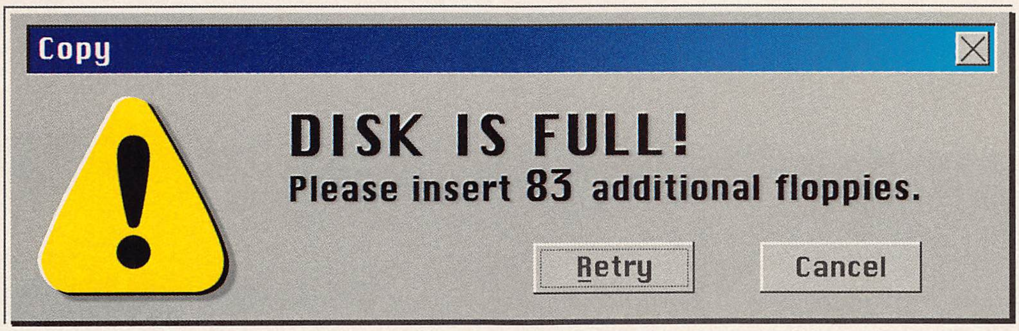
Sony GDM F500

SYSTEM OF THE YEAR

CyberMax Enthusiast AP6 This 650MHz Athlon-powered bad boy wins System of the Year for flooring us with breakthrough benchmark scores during a period of ho-hum performance from other machines. When we reviewed it in October, the AP6 beat the competition by 43 points in our *SYSmark* Windows apps test, and 41 points in our basic bootMark test—monumental performance leaps, indeed. For a great bundle price of $2,400, the AP6 also includes a 19-inch flat-screen Mitsubishi-built CRT, 27GB UDMA/66 hard drive, and CD-RW drive.

The unit we reviewed included a Voodoo^3 3500 videocard, but you can now opt for a faster GeForce-based card. CyberMax's Enthusiast line is also keeping pace with technology by offering a 700MHz Athlon. Performance-wise, we would expect a fully stacked Enthusiast-series PC to run neck-and-neck with a fully stacked Alienware Area 51 (reviewed on page 110). Both systems use the same motherboard and core technologies, but it looks as though Cybermax is roundly brutalizing Alienware on the pricing front. Let us know if you can find a more powerful, better-priced deal in an Athlon-based system. *Received a 9/Kick Ass in October, $2,400 w/monitor, www.cybmax.com*

For definitions of Terminator words, hyperlink to the back of Maximum PC.



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Maximum Game Hype MASSA

Our resident end boss, T. Liam McDonald, rips through the season's most overhyped titles and delivers the bottom line on which games are worth your hard-earned $50. Don't spend a penny without knowing the difference between gaming fact and marketing fiction.

Imagine working on a project for two, three, even four years, then watching it get pushed out the door to meet an inflexible shipping date that's based on holiday shopping, not quality product. That's what happens every year to code-hackers in the PC gaming business. More games are released during November and December than during the other 10 months of the year combined—and less than 1% of those that are released are even worth installing.

There's no point in raging against the stupidity of the system, because it seems as though publishers are too dim to listen. But the sheer volume of crap that the system produces *does* create problems for gamers facing a tidal wave of heavily marketed mega-products, all vying for your limited dollars. That's why I'm going to look at this season's most-hyped games, most highly anticipated games, and games I just plain like. The good news is that there are actually a few gems among the mountain of million-dollar bombs. I'll give you snippets of the hype included in each game's actual marketing material, followed by the real story. All the titles discussed herein should be available by Christmas (but how many times have you heard that before?).

ORE

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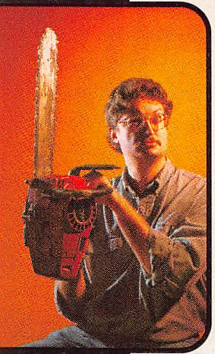
PHOTOGRAPHY BY NICK D'AMICO



Quake III Arena

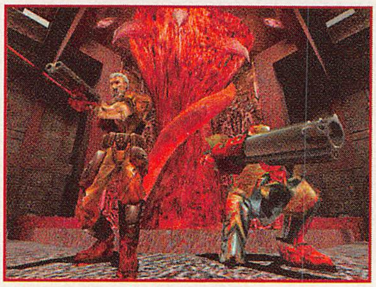
GENRE: First-person online shooter

HYPE: "A technological masterpiece of vision, sound, and nerve-jarring fun forged by the masters at id Software, *Quake III Arena* transports players to a dark underworld where the greatest warriors of all time lock horns in no-holds-barred combat."

REALITY CHECK: If you've never heard of *Quake III*, it's time to re-up for that *Adventures in Needlepoint* subscription. *Arena* is more than next-generation *Quake* technology—it's a radical shift in focus from the single-player experience toward multiplayer.

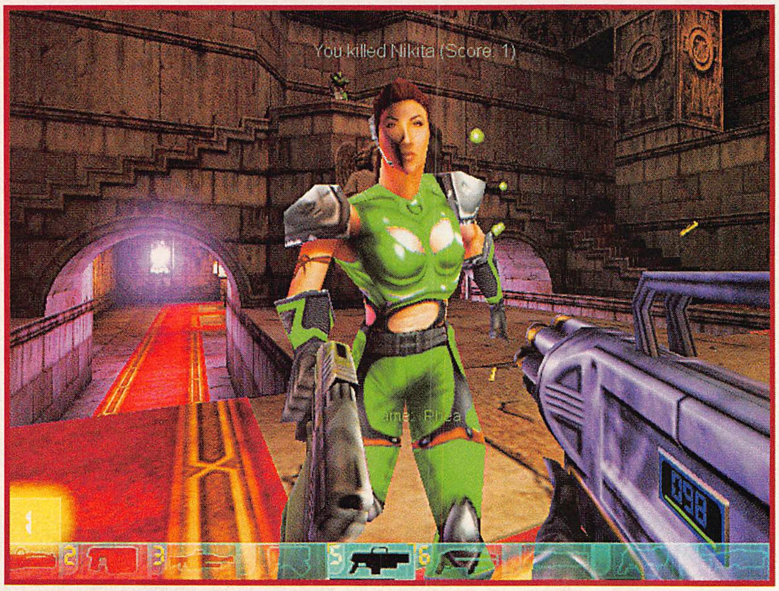
When it was first introduced a few years ago, the multiplayer concept seemed foolhardy to many—myself included. Multiplayer could never supplant single-player, or so we thought. Now, the decision to go multiplayer seems positively prescient; it's a genre rapidly gathering steam, and no one is better poised to benefit than id and the *Quake* legacy. Rather than spelling the death of the single-player experience, multiplayer merely replaces pseudo narrative-level progression with Deathmatch-like fragathons. "Smart" bots with scalable AI actually assess the current combat situation, instead of following scripts and waypoints.

id's goal is to engage players in an online multiplayer gaming session in no more than three clicks. If they can pull that off, they may just bring the multiplayer genre to the masses. Couple that with Bezier curves, volumetric fog, specular lighting, higher polygon counts, more sophisticated texture maps, and a simultaneous rollout for Mac, PC, and Unix, and *Quake III* stands a good chance of being propelled to the top of everyone's list.



More weapons, faster connections, better graphics, up to 200 opponents (in theory), and the most scorching action play on the net: Is there anything Quake III Arena can't do?

All in all, the *Quake III* hype is pretty much on the mark. All systems are go, largely because a long beta program ferreted most kinks out of the system. Carmack and his team take their time and do things right, creating some of the tightest code in the business. When Q3 hits, it will be ready, and it will be amazing.



Unreal does bright colors far better than Quake, which still tends toward a muddy brown look. That, combined with Unreal's incredible world-creation abilities, will make the online game like none other, and may lure Quake players away.

Unreal Tournament

GENRE: First-person online shooter

HYPE: "*Unreal Tournament* has it all: a ton of amazing levels, kick-ass new weapons, brain-melting new modes of play, unbelievably deadly bots, and a slew of other features bound to have your happiness glands working overtime!"

REALITY CHECK: If the most-recently released demo realistically indicates what the final release of *UT* will look like, we're in for an amazing ride. The development process has been slow, raising the ire of fans and making the industry wonder whether Epic can bottle lightning a second time.

UT is, of course, going nuts-to-butts with *Quake III Arena*, so comparisons are not only inevitable, but quite helpful. Visually? They're about on par with one another. Ease of starting a new game? Up for grabs; both seem good. Speed? *Q3* looks faster so far, but as I write this, *UT* is not yet complete. Types of deathmatch play available? *UT* wins, hands down: As of now, match types include CTF, a Team Fortress-like assault game, a game of territorial possession, and tons of Bot-based solo deathmatching.

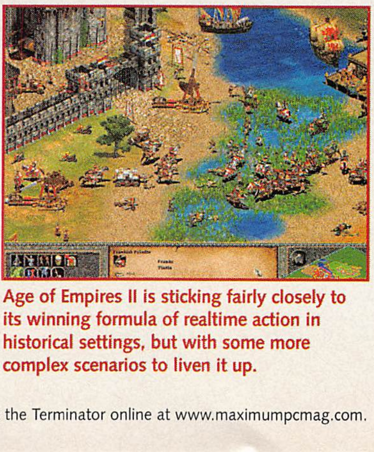
Everyone will have an opinion on which game is better, and they'll all be wrong. The facts are: Both have been in development for some time, and both will almost certainly ship stable, look good, and play well. When you're in the store, flip a coin.

Age of Empires II

GENRE: Strategy

HYPE: "*Age of Empires II* spans a thousand years, from the Dark Ages to the late medieval period, in which players control the destiny of humankind from the fall of Rome through the Middle Ages."

REALITY CHECK: Beneath the original game's amazing graphics and historical trappings beat a fairly conventional realtime combat strategy game—and not a very good one at that. The path-finding was screwy, the tech tree was limited, and the combat AI was positively French in its military acumen. Of course, it sold



Age of Empires II is sticking fairly closely to its winning formula of realtime action in historical settings, but with some more complex scenarios to liven it up.

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The Queen, by **Martin Murphy** ©1999

Super model, super tools

Professional digital artist, **Martin Murphy**, requires software that yields magnificent images. That's why he uses 2D and 3D software from **MetaCreations**® to create incredible artwork like the ***The Queen***. For the 3D character, modeling and rendering he used **Poser**®, **Ray Dream Studio** and **Bryce**®. For the 2D image manipulation, **Painter**. The results are incomparable, the price incredible. **To find out exactly how Martin created *The Queen*, see the complete tutorial at www.metacreations.com/thequeen**.

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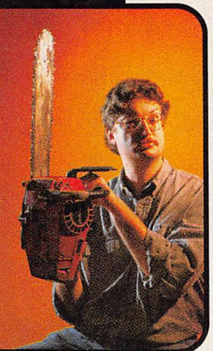


a zillion copies. I don't understand you people; first *Deer Hunter*, and now this.

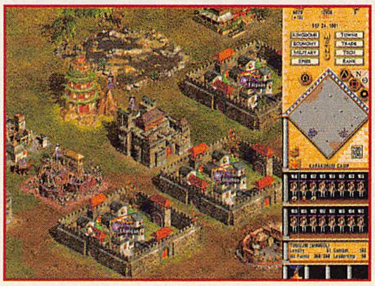
Age of Empires II: Age of Kings landed on my desk with a thud, and looks suspiciously similar to the original. Subtle design changes and an emphasis on scenario scripting show that it may have matured from a last-gen *Warcraft* clone to a this-gen *Tiberian Sun* clone in a toga. To be fair, this version boasts a more complex tech tree, and better unit-balancing helps nudge the combat/action feel into the strategy realm. But at its core, *Age of Empires II* is the same game as the original. If you weren't bowled over by the depth of the first version, *AOEII* isn't likely to change your mind. If you did like the first installment, then have at the second—and don't forget, your copy of *Trophy Buck* is on hold at Babbages. But if it's true gameplay depth you crave, turn your attentions to…

Seven Kingdoms II

GENRE: Strategy

HYPE: "*Seven Kingdoms II* gives you heroes, 3D rolling terrain, a Random Campaign Generator, an incredible number of fighting units and weapons, more beautiful and detailed buildings than you will know what to do with, expanded espionage and research capabilities, and numerous other new features."

REALITY CHECK: Arriving at the same time as the original *Age of Empires* but saddled with a small publisher and poor graphics, *Seven Kingdoms* didn't seem to stand a chance. Still, it sold some 100,000 units, enough to warrant a sequel. *Seven Kingdoms II* improves upon just about every element of the original: The graphics are up to snuff, and online hosting and smooth Internet play render it capable of taking on *Age of Empires II*. It's actually a much deeper game than *AOE*, with an elaborate economics model, an intriguing mix of races and units, and a complex set of interrelationships among the various empire-building factors: diplomacy, race, religion, technology, happiness, money, production, and so on. There's also the option to play as a monstrous group called the Fryhtans, who are rewarded for killing innocents and enslaving towns.



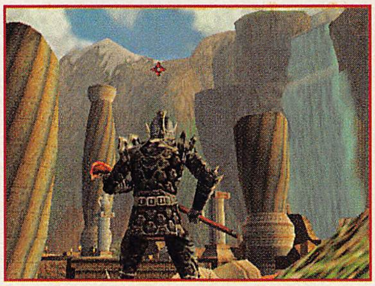
Seven Kingdoms II is going to be one of the season's sleepers, cherished by gamers who value strong strategy gaming but overlooked in the rush to Age of Empires II.

On the whole, *SKII* is a realtime strategy game that blends combat with the more complex elements of imperialism. The game introduces so many possibilities—including random games and a game editor—that it should enjoy a long life. For perspective purposes: *Age of Empires* is akin to *Warcraft*, while *Seven Kingdoms* is closer to *Civilization*. Which you prefer is wholly a matter of taste. Both are prime examples of their genre.

Ultima Ascension

GENRE: Role-playing game

HYPE: "The return of the best-selling role-playing game of all time and Lord British's greatest masterpiece ever."



No, you're not imaging things: That's your hero's back in the new Ultima adventure, Ascension. A 3D third-person Ultima? Will the indignities never end?

REALITY CHECK: So, while *Ultima* fans are flocking to pay $10 a month for an old-timey RPG experience, what does Origin do? Makes *Ultima Ascension* a 3D third-person game. Giant doh! Fans almost universally despised the action-heavy *Ultima VIII*, not because it was really that bad, but because it was so different from the other games in the series.

It's possible that *Ultima Online* gained popularity because it captures the feel of the older Ultima games. But if fans got what they *think* they want from this latest version—the old game with better graphics—they'd probably grouse that it was the same old thing. Therein lies the proof that only a lunatic pays attention to fans when designing a game.

SLEEPER HITS

Definitely check out the demos of the following games. They may not be the most-hyped titles this holiday season, but sometimes, great things come in humble packaging.

Homeworld

Relic's *Homeworld* (reviewed on page 113 of this issue) hit a little early for me to include it in this holiday piece, but make no mistake: This is one of the best, if not the best, games of the year. It shatters the realtime strategy genre by providing space combat action in three dimensions—that is, units move on both the horizontal and vertical planes. Plus, the whole thing is wrapped in a compelling and well-told story. People will be talking about this one for some time, so if you don't already have it, get it.

NASCAR Racing 3

This one also touched down a bit early on the holiday hype curve, but it is, hands down, the greatest racing sim available. The steep learning curve that's characterized this developer's previous game's is blunted here by plenty of features and difficulty settings.

Vampire: The Masquerade—Redemption

If I could have gotten my hands on a recent build of this, I almost certainly would have made it a featured selection. Previous demos showed it to be a deep, fully realized horror/fantasy action/RPG hybrid set in a sumptuous landscape.

Interstate 82

I've played a bit of this and it looks damn fine, with narrative-driven carnage similar to that found in the original, but this time set to a New Wave '80s beat. Along with *Driver*, it provides some of the best racing action this season.

SWAT 3

Considering that the first two games in this series pretty much blew, it's great to see number three come on like gangbusters with *Rainbow 6*-style first-person squad action. The AI wasn't functional when I played, so this one could still plotz, but keep an eye on it.

CONTINUED

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Ultima Ascension has suffered problems along the way; I saw it a few years ago when it was a top-down 2D adventure called *Ultima 9*. The good news is that the final release will have fewer jumping puzzles. The bad news is that you'll have to cope with one of those damned free-floating cameras that's almost never pointing where you need it to when you need it to.

What's the skinny for old-time fans? Well, there's an elaborate magic system (based on the old reagent system) that should prove satisfying. The story will be quite elaborate, and the world completely dynamic. The graphics engine is a stunner, with day-to-night transitions, loads of NPCs going about their daily routines, and clocks that keep real time. However, long-time RPG fans are right to look dubiously upon *Ultima Ascension*. In particular, they'll be unhappy to learn that it's a solo adventure as opposed to a team-based jaunt, with a fair amount of combat.

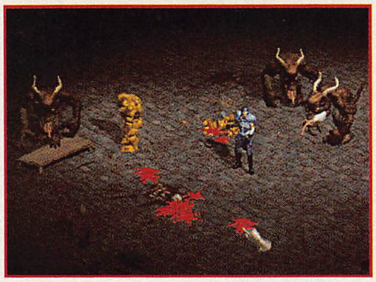
Overall, this one's a total crapshoot. It may turn out to be an amazing reinvention of a seminal series, or it could be a total hump job. This much is certain: It will look great, the world will be rich and amazing, the story will be detailed, and the camera angles will be infuriating.

Diablo II

GENRE: Action/Role-playing

HYPE: "Return to a world of dark fantasy, journey across distant lands, fight new villains, discover new treasures, and uncover ancient mysteries."

REALITY CHECK: In other words, more of the same, right? Not necessarily. Early peeks at the work-in-progress unearthed only a few differences from the original *Diablo*, but recent looks seem to indicate that those differences have mounted. Now, *Diablo II* looks like much more than a giant add-on pack. The interface has been streamlined, lending a more open, integrated feel to the screen. "Stamina" has been added as a stat, so your hero becomes fatigued after running a lot. Teleporting enables you to quickly zap between two points, ending all that backtracking. And, as expected, the game looks much better overall, with finer backgrounds, more detailed characters, and some smoothing via optional hardware acceleration.



More items and a better inventory and item-storage system have been added to Diablo II.

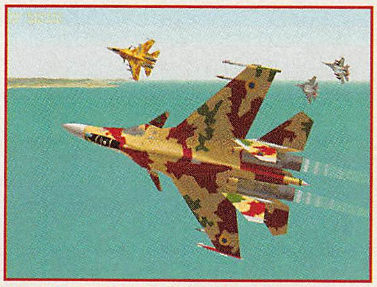
Many of these changes have resulted in a game that's less of a pure action experience and more of a true role-playing game. Character development is more complex, with five classes of very different skills sets. Even the manner in which characters progress is more refined, creating true distinctions among the classes. The final product is more than just a refined *Diablo*—it's truer RPG that doesn't sacrifice the relatively straightforward and fast-paced play that made the original such an online hit. Given the care that Blizzard lavishes on its products, the decision to buy *Diablo II* is a no-brainer for fans of the original.

Flanker 2.0

GENRE: Flight sim

HYPE: "*Flanker 2.0* features stunning graphics and streamlined playability—without compromising the technical excellence of its famous predecessor!"

REALITY CHECK: The Russian-based Flanker development team has been hard at work for a few years now on this follow-up to *Su-27*, and all that time has resulted in a better, more stable game. The detail in this sim is amazing; from a flight model that will undoubtedly be the finest on the market, to ground details such as tiny war memorials, this has it all. It's still a low-chrome, hard-core sim that



It's only a couple of years late, but once you see the amazing detail in both flight performance and visuals, you'll know Flanker 2 was worth the wait

Oni

All I know about Bungie's anime-style game is that it's a plot driven third-person action/fighting game, the shots look very good, and the list of hand-to-hand fighting moves is amazing. "*Quake* meets *Virtual Fighter*" is the most common description. Bungie, creators of *Myth*, have no track record for this kind of game, but they have proven themselves to be a gifted group of developers.

Battlezone II

Judging by the sales numbers, chances are you didn't play *Battlezone*, a genre-shattering hybrid strategy/action game in which you both build a force and fight first-person. It's not nearly as hard to manage as it sounds. Don't make the same mistake twice—just get it, okay?

F/A-18

Will this be the last hardcore sim from Jane's? Quite possibly, since *A-10* was cancelled deep into development. Expect the same attention to detail that made *F-15* and *Longbow* sim favorites.

ONWARD INTO THE VOID

And what shall 2000 bring, aside from The Rapture? Here are some long-delayed projects that have many gamers drooling with anticipation.

Force Commander

Command & Conquer in the Star Wars universe. Can Lucas inject something fresh into an overworked genre? Can you say *Star Wars Rebellion*?

Black & White

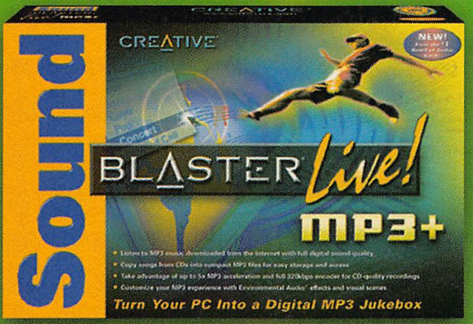
The debut title from Peter Molyneux's Lionhead Studios has a bit of a *Populous*/*Magic Carpet* feel, as you control the lives of villagers and send them off to fight. *Populous: The Beginning* went in a similar direction with negligible results.

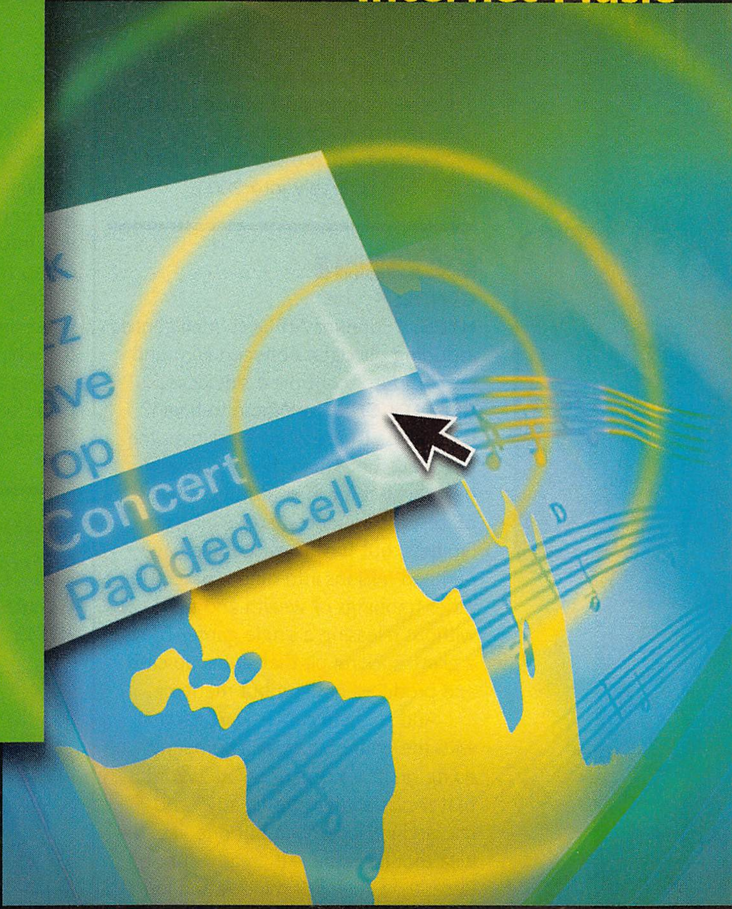
Giants

The demos look awesome for this wild first-person actioner. It's full of characters with great

CONTINUED

Internet Music





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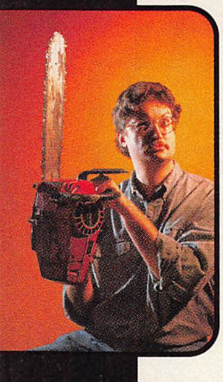


eschews pretty cut scenes and presents a relatively utilitarian front end, but none of that matters a bit. *Flanker 2* will be the hardcore sim for most of 2000, and probably into 2001.

Daikatana

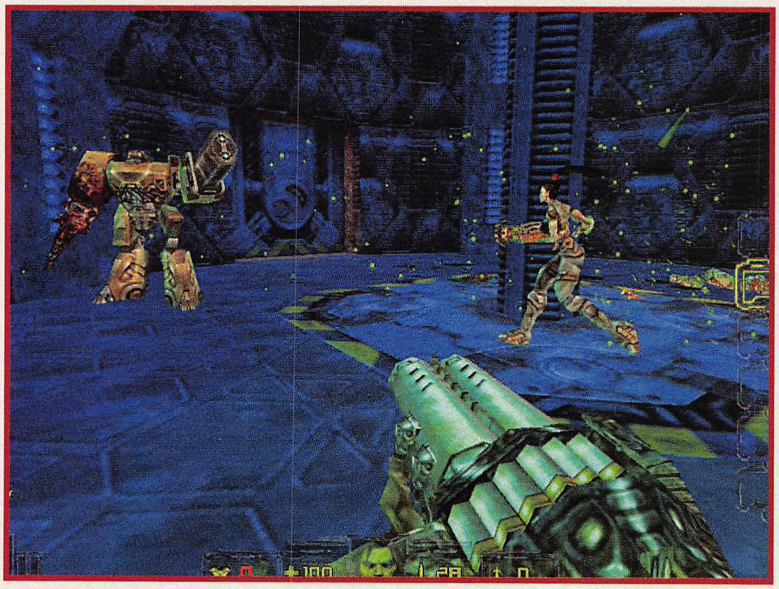
GENRE: Action

HYPE: "Superior Artificial Intelligence, including dialogue between Hiro and his computer-controlled sidekicks..."

REALITY CHECK: Where to begin? It's fruitless to beat Ion Storm over the head any more than they've already been beaten for their attitude, their offices, their lateness, and their hair. Fruitless, but fun. These people have pumped millions into office space and other trappings of wealth and fame, all without releasing a single game. They're a giant, sucking pit that slurps up cash and produces nothing but methane.

And so, here comes *Daikatana*, with the entire future of a company riding on its success or failure. Word is that *Daikatana* will be "ready" and released in November, but one gets the idea that it's more like "ready or not." Recently, a friend of mine visited Ion Storm for a full-blown run-through of the game. His report? The environments look good, with plenty of small details and very different climates for ancient Greece, Dark-Ages Norway, 21st-Century San Francisco, and Japan 500 years hence. Deathmatch was reportedly fast, clean, and conventional. In other words, it's a one-each first-person shooter with a really big budget and hair extensions.

But one big problem looms: The bot AI upon which Ion is staking so much was deeply flawed just two months before a hell-or-high-water ship date. The smart sidekicks were fighting, but they couldn't climb ladders or follow you through tunnels. This was in a demo for a reporter sent there specifically to write about the bots; not a good sign. Still, Eidos continues to crack the whip in order to get this sucker on shelves, which could mean a boxed beta. Ion Storm might pull this off, but the magic 8-ball tells me "Try Again."

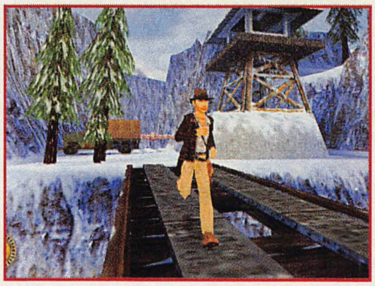


Daikatana looks promising, but last-minute AI problems could make the in-depth storyline and detailed environments a total waste of time.

Indiana Jones and the Infernal Machine

GENRE: Adventure

HYPE: "A new realtime 3D action-adventure… fraught with all the action and intrigue worthy of a classic Indiana Jones film."



Indiana Croft … um, I mean Indiana Jones goes 3D and third person in Hal Barwood's first Indy adventure since Fate of Atlantis.

REALITY CHECK: I'm dreading this game the same way I dread every new Mel Brooks movie: How could the man who made *Blazing Saddles* and *Young Frankenstein* put his name on *Robin Hood: Men in Tights*?

Indiana Jones and the Fate of Atlantis is still one my all-time favorite gaming experiences. An animated side-view narrative/puzzle adventure, it's funny and challenging—and as obsolete as the 8-track. Indy's grand return must boast something new and 21st century—in other words, 3D. Creator Hal Barwood, certainly one of game design's titans, is back at the helm for this first Indy adventure since *Fate*, and Lucas has done excellent work on 3D games like *Jedi Knight*. In theory, *Infernal Machine* will be a great game. So, why do I have reservations?

It's my gut-level aversion to seeing Indiana Jones turned into Lara Croft without the boobs—it just seems wrong. I never was all that smitten with *Tomb Raider* and its clones, and the current 3D-izing of gems like *Prince of Persia* doesn't exactly inspire confidence. What I've seen of *Infernal Machine* looks technically marvelous, but that third-person, over-the-shoulder perspective is, always was, and always shall be a hopelessly screwed European convention. Watching demos of Indy push blocks and trip levers gave me unpleasant feelings. Aren't there too many games like this and too few good adventures? I know 3D is inevitable, and that the days of the animated 2D adventure game are past, but creeping nostalgia keeps me from thinking this is a good thing. ✹

skills, such as crushing enemies with bare hands and changing the landscape to block an enemy.

The Sims

Wil Wright's new life simulator zooms from city- to living room-level as you play with the lives of individual people. Sim products aside from *SimCity* have a pretty checkered history, but Wright is a good designer and the early buzz is positive.

Team Fortress 2

Since it will clear the *Unreal/Quake Arena* bottleneck by at least six months, and is slated to feature awesome gameplay, *TF2* should have the field to itself.

Duke Nukem Forever

Your guess is as good as mine.

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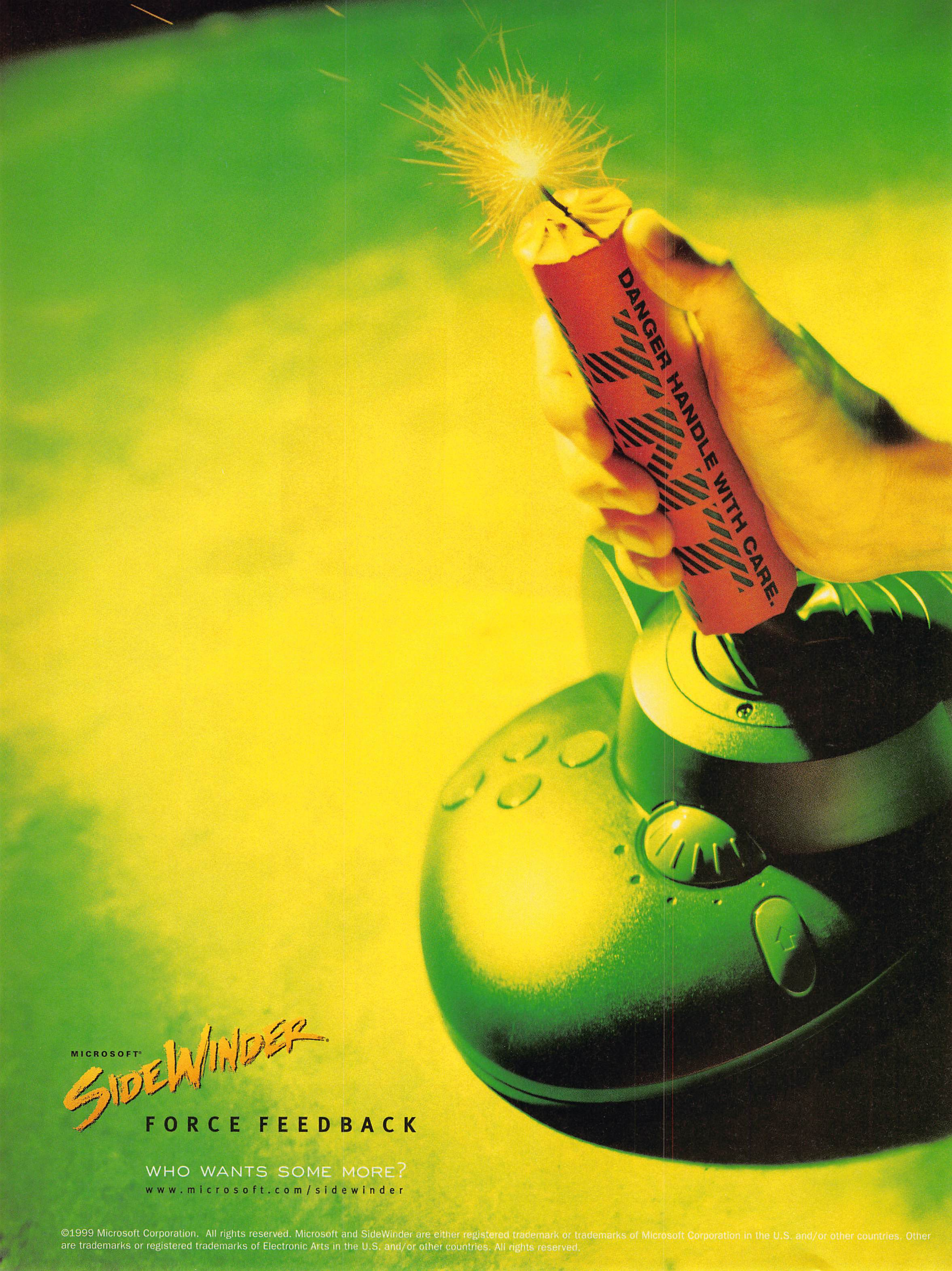

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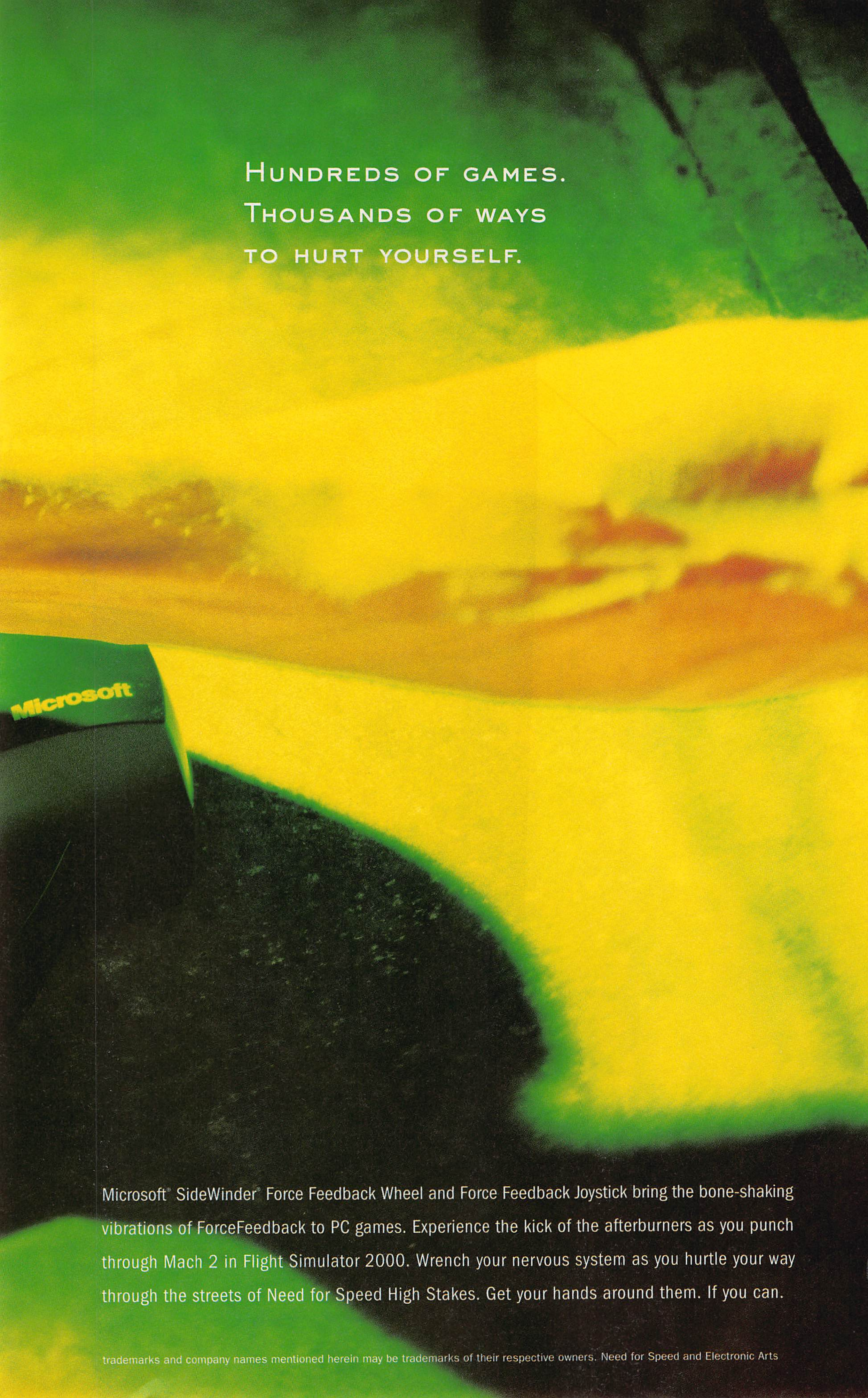

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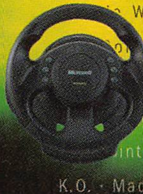

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20/20

Yes, your vision is fine, but what's wrong with this picture?

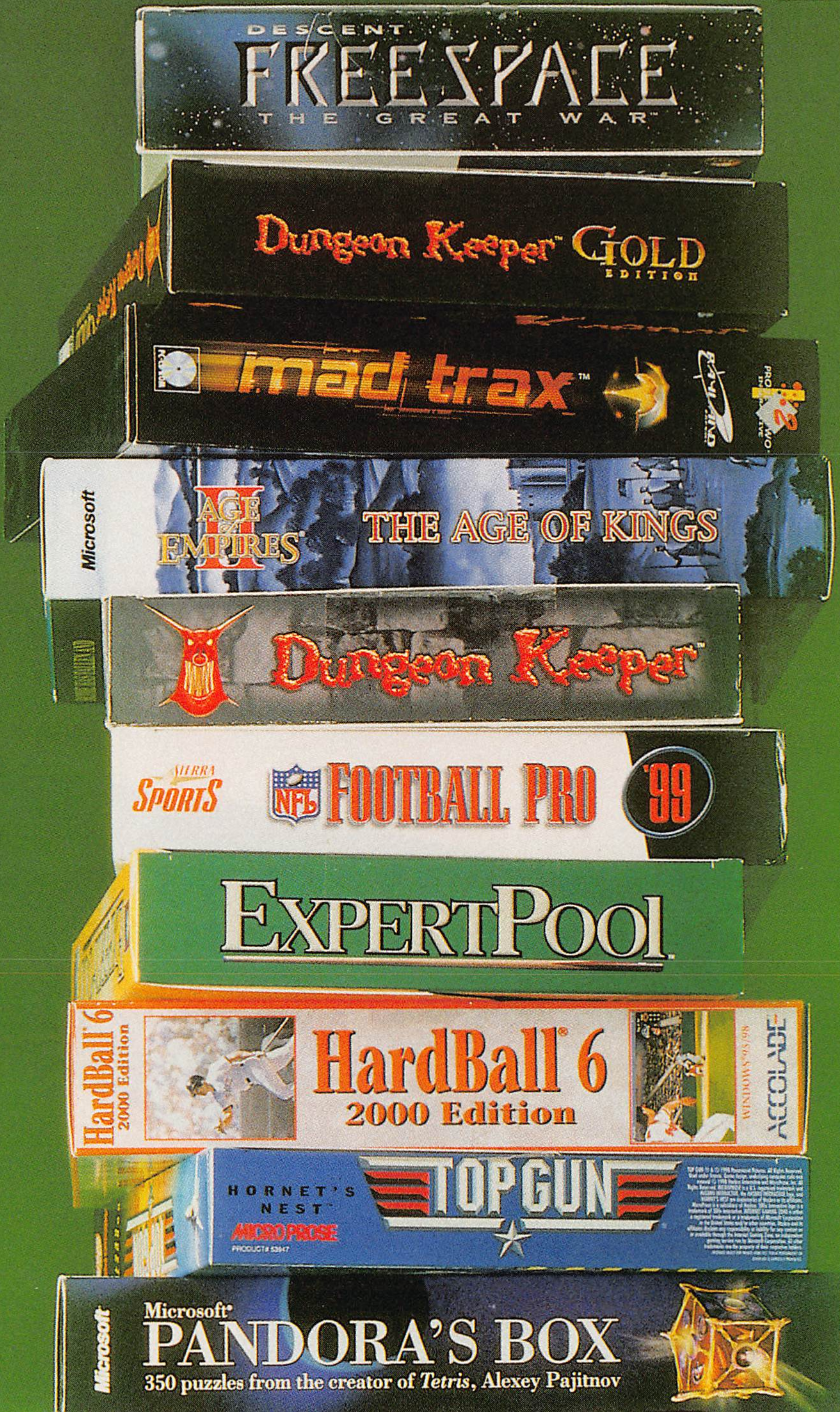
by Bryan Del Rizzo

Jewel cases are good enough for the console gaming and music crowds, so why the heck does the PC gaming industry continue to sell its wares in boxes full of air? The Activisions, Electronic Arts, and Interplays of the world all point to the realities of retail competition: For a game to move off the shelves of your local CompUSA, it needs to grab your eyes like a box of Cap'n Crunch. So goes the hard-sell justification.

Meanwhile, this ridiculous packaging is killing trees—and, environmental concerns aside, 20 oversized game boxes cost a lot more to produce and ship than 20 humble jewel cases. Shipping charges are affected by both weight and dimension, and this ultimately adds to the prices you pay in the store.

It's time to ditch the oversized boxes, cardboard inserts, and paper manuals in favor of something simpler. Turn the page for the Maximum PC solution...

- **32 million:** Number of game boxes produced from Jan. to Aug. 1999.*
- **124 million:** Pounds of trees needed to make 32 million game boxes.**
- **204,000:** Number of trees needed to make 32 million game boxes.***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- **$12,000:** Cost to ship 1,000 game boxes across the United States via Federal Express Freight.
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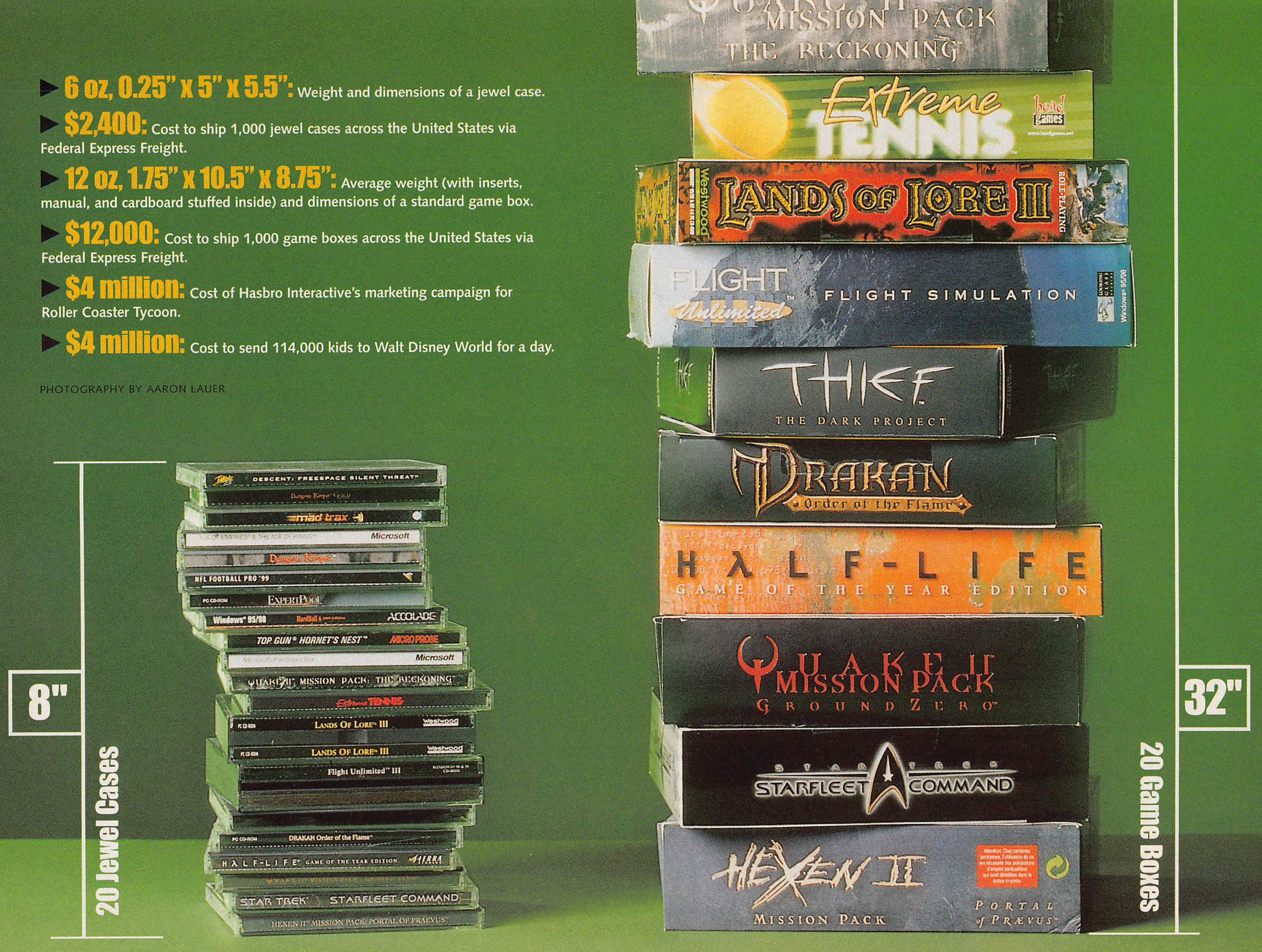
- **$4 million:** Cost to send 114,000 kids to Walt Disney World for a day.

PHOTOGRAPHY BY AARON LAUER



*According to research firm PC Data. **According to the Center for a New American Dream. ***According to the USDA Forest Service.

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OK, so maybe releasing toxic plastic smoke into the air isn't the most environmentally sound solution, but desperate times call for desperate measures. Plus, we like setting things on fire. (And what do we not like? Things that don't catch on fire!)

Let this be a warning to the gaming industry: Maximum PC is monitoring the packaging situation. Shoot, someone needs to put some pressure on these folks. According to a Sierra Club representative based in San Francisco, no environmental group is currently going after the PC gaming industry for crimes against Mother Nature. If you'd like to lead the charge on behalf of a motivated environmental group, contact the Sierra Club via www.sierraclub.org, and the Center for a New American Dream via www.newdream.org.

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60	$1,830	$ 2,250	$ 3,195	$ 8,330	$ 9,420
65	$2,920	$ 3,670	$ 5,855	$15,420	$ 15,420
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45	$ 740	$ 1,020	$ 1,112	$ 1,650	$ 1,930
50	$ 1,235	$ 1,665	$ 1,677	$ 2,550	$ 3,080
55	$ 1,880	$ 2,550	$ 2,940	$ 6,290	$ 9,095
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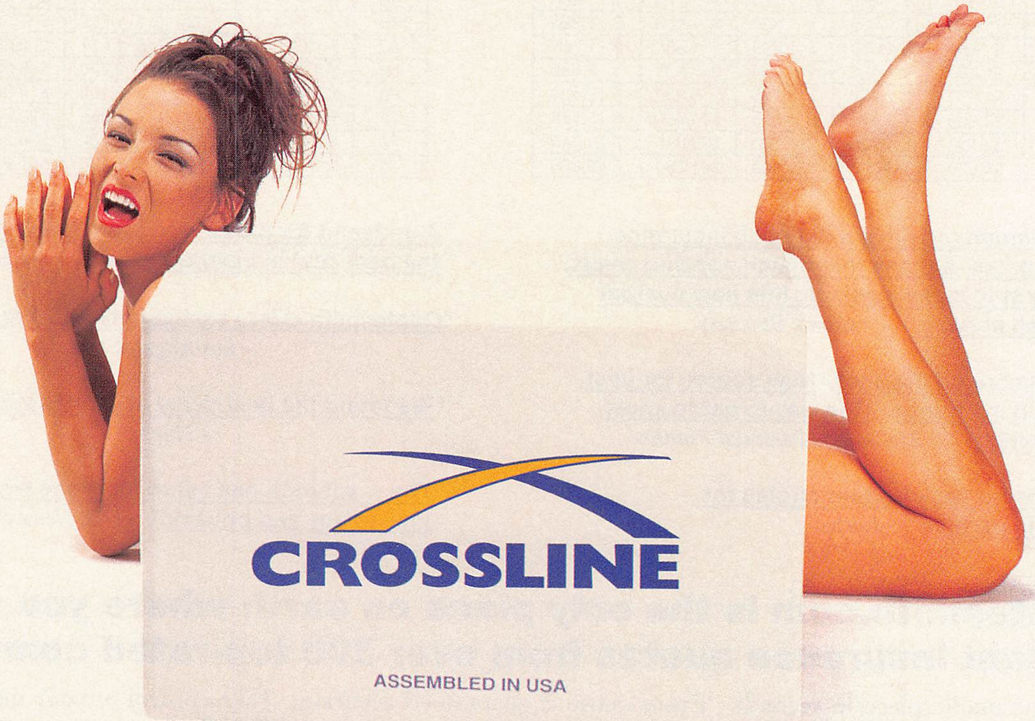
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The complete guide to
Game Emulators,
or... How to play games without really paying for them you cheating, thieving bastard!

by Jason Compton

Your processor's speed rating is higher than your street address, and you've got enough bandwidth to run your own ISP. So, whatcha' gonna do? Play some newfangled first-person shooter against 35 networked foes in the Ukraine? Hell, no! You're gonna be a stud and go old school. You're gonna download some emulators and play some real games.

Emulators—those sweet, sweet returns to yesteryear. With the right emulation software, you can transport yourself to the living room of 1979 and Atari your eyes out. Or enter the arcades of 1981 and give Donkey Kong another whipping. Or lose yourself in the 8-bit Nintendo RPGs of the early 90s. Or liberate Playstation games from your nasty, fuzzy TV screen. Game emulators let you run the titles of time immemorial right on your PC—and all they cost is your downloading patience. We'll show you what's cool, what's legit, and what you can get away with.

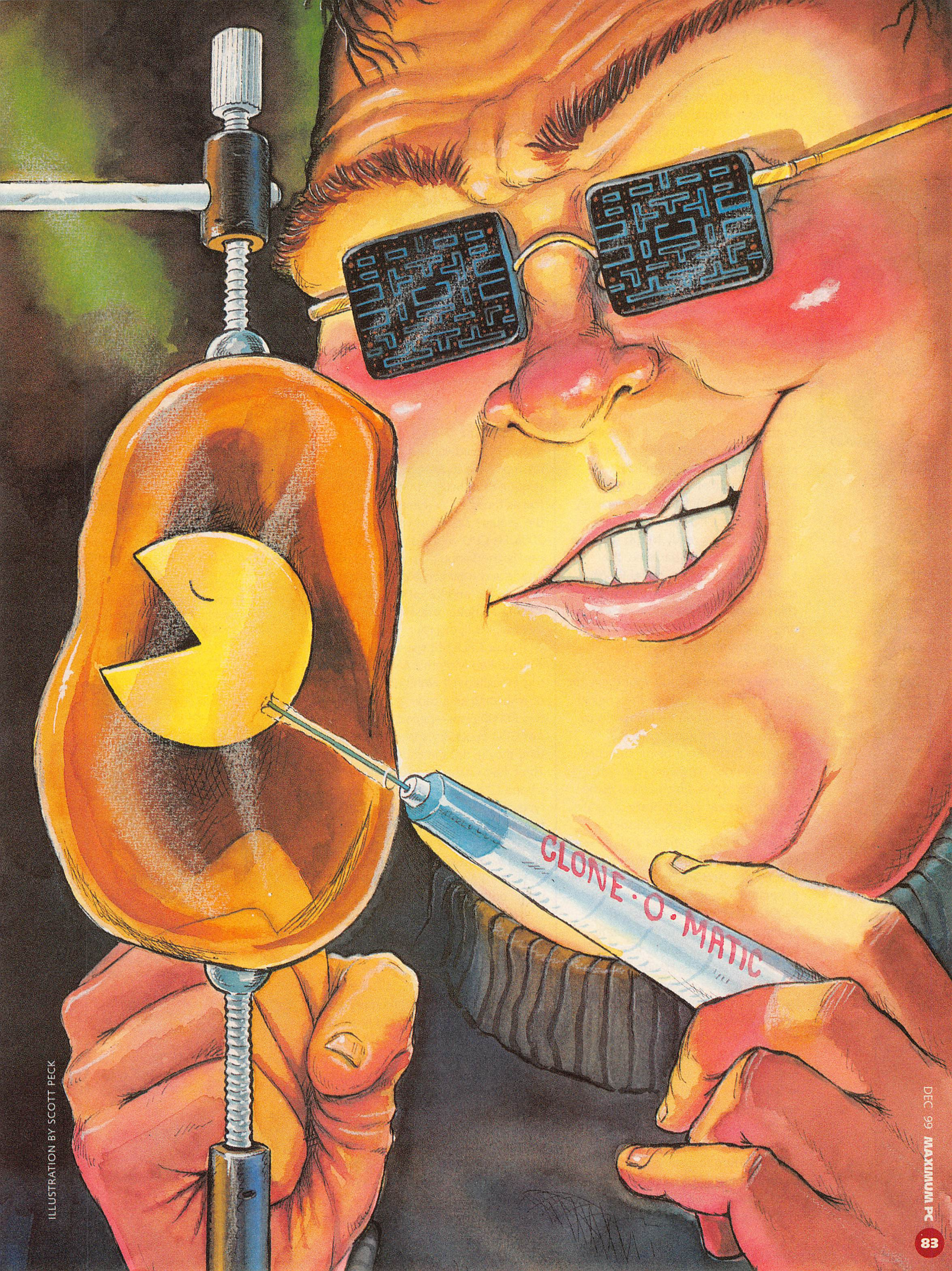
Emulation Basics

Game emulation requires you to download at least two pieces of software: (1) the emulator itself, and (2) the game code, a.k.a. ROMs or disk images, that will run in emulation mode. You may also need to download system ROMs, which are akin to your PC's BIOS.

When you run an emulator on your PC, you create an environment that simulates the entire hardware and software architecture of a different computing platform, be it an old arcade unit, a console system, or an obsolete personal computer (à la the Amiga or Commodore 64). In effect, the emulator intercepts all of a game's program requests and processes them internally, providing the emulated gaming software with the responses it expects. The emulator then translates those requests into data that Windows or DOS understands—and, voilá, yesterday's hits appear in living color on your desktop monitor.

From a technical perspective, emulating an old platform's CPU is a relatively easy task. Emulator authors create large code structures, often in C code, that describe the entire architecture of the old CPU—its instruction sets, registers, and so forth. When emulation software is executed, the C layer "runs" the program, using your CPU as a transparent surrogate for raw processing power. A big chunk of system memory allocated to the "emulated CPU" enables it to do its duties. The emulator itself also consumes a good deal of memory, so it can keep track of all those registers and opcodes.

Occasionally, emulators employ a technique called dynamic recompilation, in which code is actually translated on the fly into x86 format, so it can be run directly on the PC's CPU, rather than through an emulation layer. But in this age of hyper-clocked Pentium IIIs and Athlons, this strategy is unpopular. Running games in an emulation layer puts a big strain on your system resources, but because today's PCs are so much more powerful than yesterday's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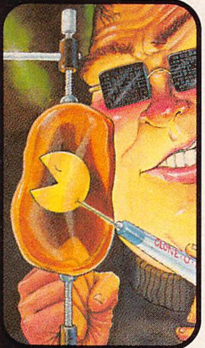


gaming platforms, you can get smooth framerates despite the overhead.

Effectively emulating the video and audio chips of old platforms is trickier than emulating their CPU cores. Many low-level technical details of old console and arcade chips were proprietary secrets, or at least closely held intellectual property. Even more confounding, many of the old systems used analog components. As a result, it can take hours of reverse engineering to translate the functionality of old video and audio chips into easy-to-read, portable source code that can talk to DirectX. And that reverse engineering can sometimes cause legal trouble: Sony and Nintendo are less-than-thrilled by developers who've concocted Playstation and Nintendo 64 emulators (but since their ire doesn't appear to be stopping emulator authors, don't let it stop you, either).

After your emulator has effectively tied together CPU, video, and audio functionality, it's ready to run software. In casual emulation parlance, the games themselves are called ROMs, short for the "read-only memory" chips onto which the game code was originally hard-coded. Though no longer committed to silicon—the ROMs are simply soft mirrors of the original chips—the code your emulator runs is the *actual* code of the original game. In fact, when it's being run by an emulator, the game code is unaware that it's not being crunched by its intended hardware platform.

In spite of this, an emulated game may not appear in historically accurate form on your PC. Typical glitches include varying framerates and off-kilter color palettes. This results from the fact that console and arcade units are tightly integrated, closed systems with standardized hardware, while PCs are configured willy-nilly with different hardware and operating system profiles.

Take a typical Playstation game, for example: It was programmed to play back at exactly the same framerate on any Playstation console anywhere in the world. Because the game developer knew the unique parameters of the Playstation hardware, he easily locked in framerates, providing a consistent experience. Even more significantly, the developer never anticipated that anyone would run his code on foreign hardware. Run that same Playstation game in emulation mode on a PC, and your framerates will fluctuate according to the vagaries of Windows 98 and the overhead introduced by apps and routines running in the background. Maybe everything will run smooth and easy until, for example, an open Netscape session spontaneously decides to clear out its page cache.

Emulated games aren't perfect re-creations of the original experience, and no one will argue that playing *Tron* at home with a cheap keyboard feels the same as standing in an arcade with a big plastic grip and a dial control in front of you. But remember—you're getting something for nothing, pally, and half the thrill of digging the emulation scene is searching online for hidden treasure.

Hardware Tips

If your PC hardware isn't up to spec, it's impossible to engage in the "suspension of disbelief" that makes you feel as though you're really playing the genuine articles of yesteryear. A 200MHz CPU with a decent 2D videocard is good enough to run most old arcade and 8-bit console emulators. To emulate 16- and 32-bit computers or gaming consoles, consider a Pentium II, Celeron, K6-II, or faster.

If your CPU isn't speedy enough to emulate two Motorola 68000 processors in realtime, it won't do a great job of emulating an arcade game that used two 68000 chips—period. And while raw CPU frequency speeds are important, they're not the end-all be-all. Three tips: Cache, cache, cache. In fact, L1 and L2 cache are important for *any* type of software emulation. Also, the faster your system bus is, the better off you'll be. And stay away from integrated video/audio components.

Here's a part-by-part breakdown of the optimal emulation box:

Video Most emulated games are 2D beasts, so good 2D performance should be your top priority. Your videocard should be at least PCI—yes, ISA graphics controllers do exist—with as much dedicated onboard memory as possible. If your motherboard hosts an onboard graphics chip that's stealing system memory, ditch it for a real card.

Obviously, emulators for the latest consoles require top-notch 3D performance, so be sure you have a wicked accelerator if you plan to play next-gen games. Likewise, DirectX is becoming more and more popular among emulation authors, so get up to date on the driver front.

System Memory Emulators often

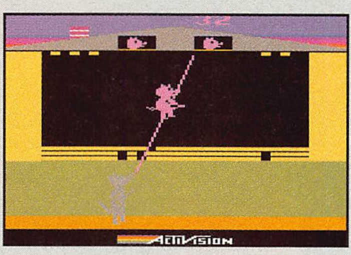
Our Favorite Emulators and the ROMs that Love Them

Here's a list of all the emulators that ape popular gaming platforms. We also list some games you can run in emulation mode. Go to the web sites listed on page 88 to download all this software.

▶ ATARI 2600

Emulate With: Stella or Virtual 2600

The console world will probably never forget the old Atari VCS, which ruled the scene for the better part of a decade. Too young to have played on an Atari 2600 in the flesh?

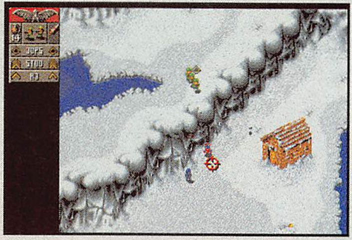


Remedy that situation with an emulator. **Oink! You're the Three Little Pigs, and the Big Bad Wolf is blowing down your house, which you have to keep re-bricking, or he'll huff and puff and ultimately eat you. Yes, really. Features a two player head-to-head version (your friend plays the wolf) that's a riot once you both get good at the game.**

▶ AMIGA

Emulate with: UAE or Fellow

Despite all the tragic ups and downs of their platform, Amiga programmers did manage to churn out some of the most entertaining games to ever fit on a few floppies.



Cannon Fodder The mouse control of troops is outstanding, and blowing the roof off of those enemy encampments is still a thrill. If the hill that fills with memorials as your soldiers are cut down doesn't give you a moment of pause, you don't have a soul.

▶ APPLE II

Emulate with: AppleWin or Apple II Emulator (Apl24win)

The Apple II's awful color set and atrocious sound be damned. The platform was easy to develop for and had a large enthusiast market, so games came out in big numbers.

▶ ATARI 800

Emulate with: Atari 800 Emulator and Rainbow 95

Atari obliterated the console competition, but its desktop platforms always lagged behind. Price was the biggest problem: Your parents probably couldn't afford one, so check out its games now.

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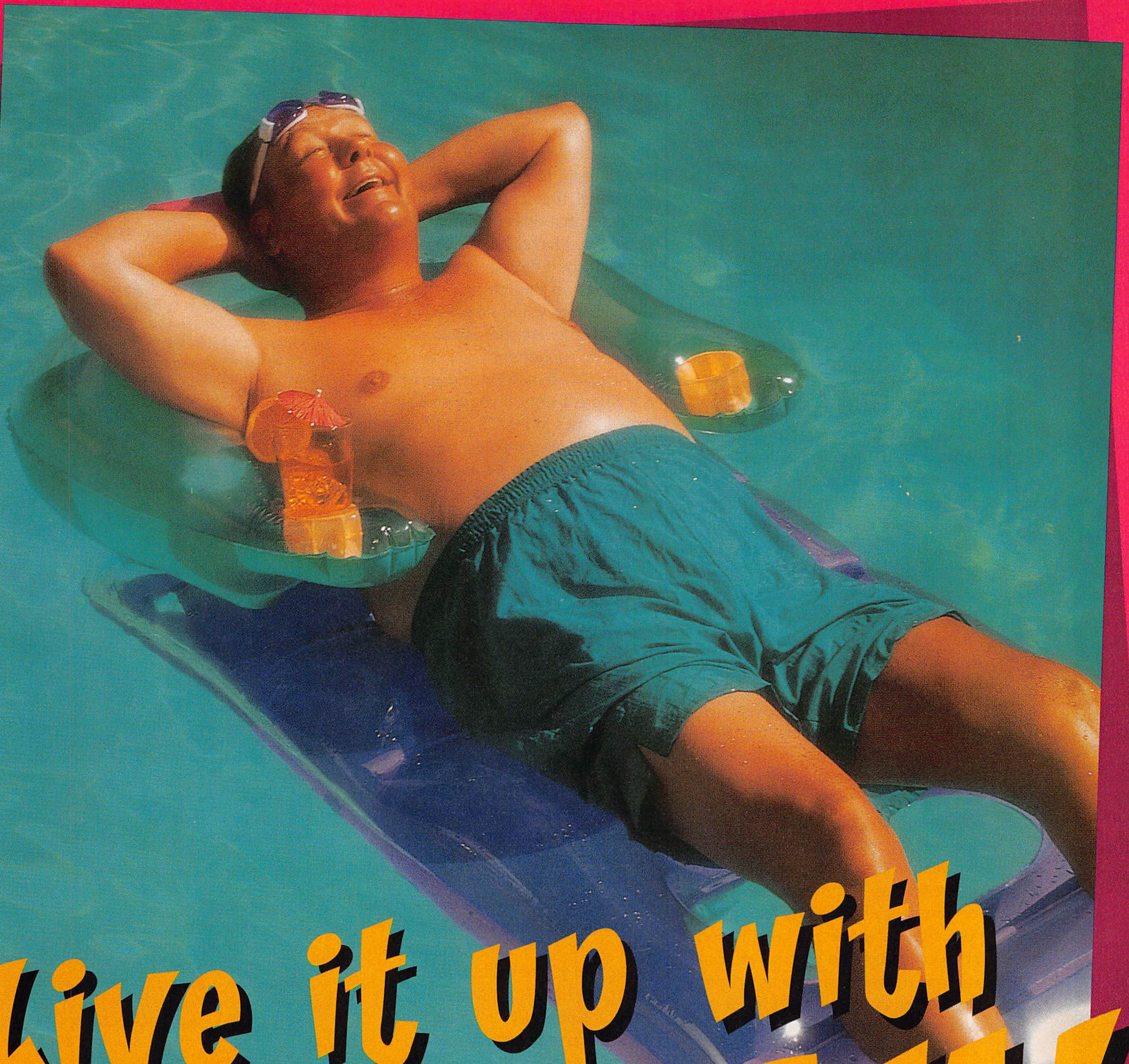

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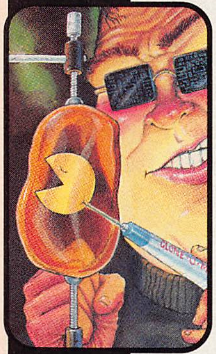


consume large quantities of RAM in order to work their magic; if you emulate a full-blown computer system, you'll want to have enough memory free to delegate a comfortable chunk to the virtual system. 64MB is about the minimum you should work with. Because emulators push around much more data than the real computer would (to account for the emulator's overhead), a fast memory bus is also mandatory. If you've been thinking about going PC100 or better, now would be a good time. At the very least, replace those 80ns SIMMs.

CD-ROM For active CD access—which would, for example, enable you to run actual Playstation CD-ROMs through a Playstation emulator—ignore speed ratings and look for low seek times, DMA access, and fast spin-up. You want consistency, not peak speed.

Soundcard For best performance, disable and replace any el-cheapo, motherboard-mounted sound chips, which tend to live on the ISA bus. Get a real PCI sound card.

Controllers Fast-action, digital joysticks ruled the gaming scene of the 80s and early 90s, both at home and in the arcade. Unfortunately, the quirky evolution of the PC has given us Playstation-knockoff gamepads, super-featured flight sticks, and very little in between. Mapping joystick commands to the keyboard-as-pseudo-joystick can be a reasonable substitute for digital response, but it's best to keep a good stock of joysticks on hand so you can mix and match to each game's particular demands. Most emulators for multi-button consoles and arcade games are aware of the many "dozens of buttons" joystick formats for the PC, so remapping is usually easy.

Operating System Shut off all unnecessary tasks. Close all the crap in your system tray, stop task schedulers, and turn off those dumb push clients and "channel subscriptions." You might also turn off time-wasters such as Microsoft Find Fast and Task Monitor.

Some emulation freaks go really hardcore, manually shutting down non-essential processes in the task manager and booting in Safe Mode to prevent spurious programs from running. This is why DOS-based emulators are so handy: If you go full-bore into DOS mode, you don't have to worry about Windows screwing around in the background while you're trying to gobble the ghosts in Pac-Man.

Is Emulation Legal?

The software code in an emulator is almost always legal—it isn't wrong, in and of itself, to emulate.

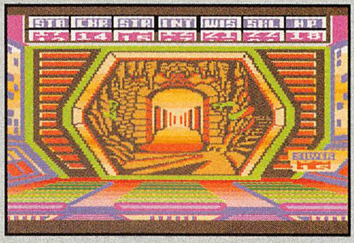
In general, if you buy or download an emulator that doesn't infringe on a patent, you have little to worry about. If a final court decision was ever rendered against the company that made the emulator, you'd simply have a piece of software that would no longer be supported.

Actual system ROM and game code is a different story. If you own legitimate licenses to the OS and ROM code for a particular computer—say, if you own a Commodore 64 and some of its games—then you implicitly have the right to use the computer system ROM code and game disk images wherever you please, as long as the code is in use in only one place at a time. At least, that's the most popular theory.

The best available litmus test is Macintosh emulation, which requires Apple ROM code in order to function. For the past decade, Mac emulator users have been able to buy Apple ROMs from various sources, which, as far as anyone can tell, gives them a good enough license to "install" the ROM images on another platform. Basically, the logic says that if you've purchased the ROMs, you've bought the right to employ those ROMs anyway you see fit—via a board in your PC, or off a Mac. Just download a free copy of MacOS System 7 directly from Apple, and you're basically legit, without ever buying a Mac.

Arcade emulators are a different story. If you're fabulously rich and have a lot of coin-ops sitting around your rec room, you own legitimate licenses to play those games however you choose. But, odds are you don't have such arcade units—or a rec room, for that matter. You might comb through electronics junk shops looking for a *Donkey Kong* motherboard, so you can own a legitimate license for *Donkey Kong*. But, who wants to get their hands dirty with such scavenger hunts? The truth is, it's difficult to legally emulate arcade games, simply because it's difficult to buy the games in the first place.

Console cartridge games are tricky as well. It's a widely held belief that as long as you own the original cartridge, acquiring a software image of the ROM is perfectly allowable. However, don't trust web sites that claim you can download anything you want as long

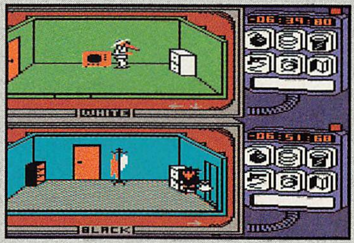


Alternate Reality: The Dungeon The two Alternate Reality RPGs were probably the best first-person RPGs written in the 80s. Unlike The City, its freeform predecessor, The Dungeon had a more rigid quest-and-goal structure, and the graphics looked awfully good, 8-bit system or not. And the concept of good and evil was implemented quite well.

▶ COMMODORE 64

Emulate with: Frodo, CCS, and VICE

The C64 was the king of the 80's 8-bit computers, and is still the best-selling single-model computer in history.



Spy vs. Spy Trilogy The first two Spy vs. Spy games are classic head-to-head strategy games where the optimum solution isn't just to beat the hell out of your opponent. The third installment is just a weak rehash of the second game.

▶ GAMEBOY

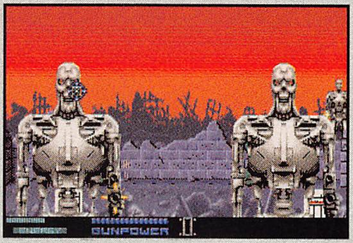
Emulate with: Hash, No$GMB, and GBEmu

Seems sort of silly to emulate a handheld on a massive power tower, doesn't it? But some of these games are fun on the big screen, too. And if you have kids, let us simply the utter magic word: Pokemon.

▶ SEGA GENESIS

Emulate with: DGen

It may have been relegated to second place in the 16-bit console wars, but we still like the old Genny for its bright colors, comfy gamepads, and cheaper cartridges.



Terminator 2: Judgement Day Sometimes, coin-op gun games translate to the home pretty well. T2 is quite playable with a joystick, although you'll need some adjustment time. The action is fast without being insane, and of course, you can imagine you're humanity's last line of defense, which is always a rush.

CONTINUED

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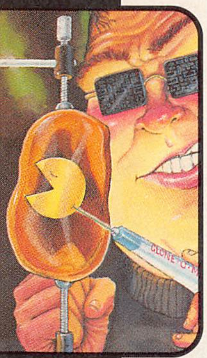


as you delete it within 24 hours—that's not even close to being a valid legal defense. If you download a game you don't already own, it's piracy, no matter how long you keep it.

So, what *does* happen to software pirates these days? In the real world, it's possible—though very, very unlikely—that the Software Publishers Association will bring a pre-dawn hellstorm down on you for illicit *Spy Hunting*. We have seen no evidence that any individual home user has ever been made an example of by the software industry. However, various console and coin-op houses have taken action against emulator sites over the years, forcing them to clean up their acts or shut down.

You'd never set up such a patently illegal operation, of course, but if someone you know wants to get into the online distribution of ROMs, he can anticipate a cease-and-desist order before too long. And in some cases, the big software companies have launched full-blown lawsuits seeking damages and lost revenues.

We've seen a few official coin-op emulators—such as Williams Arcade Classics and the Namco series for the Playstation—but most of the 1,000-plus games available for arcade emulation are simply illegal. There is some hope, however. *Robby Roto* recently became the first arcade title known to be released as freeware, and Hasbro Interactive, which owns a number of arcade titles, has openly pondered the possibility of making its ROM library more accessible.

Where to find 'em

Finding the actual emulators is easy; just search the URLs below. It would be cheating to make ROM-hunting too easy for you, so we're withholding URLs that lead to pure ROM archives. Also, some of the seedier, small-time emulation sites have a habit of disappearing at random and reappearing under new URLs. Let your search engine do the walking if you want to go slumming for a particular ROM.

Most search engines have established "Emulation" headings because the topic is so popular, but it's still better to enter your own search terms. Keep your wording simple unless you're looking for a specific game. If you want SNES ROMs, search for "snes rom," not "super nintendo emulator roms for snes on windows 98." Use a search engine that tells you the date on which the site was logged, and give preference to newer captures that are more likely to be up and running.

Many underground ROM sites are like floating craps games—always on the move, one step ahead of the authorities. But even when sites take down some of their content, they often leave links to other sites that are still active. In general, don't leave an emulation site until you've scanned through its links section.

Don't bother emulation authors, or their official project web sites, for illicit ROMs. Oh, they've got them, make no mistake, but they're too smart to send them to the likes of you. And, of course, you might consider dropping a line to your favorite arcade or software publishing house telling them that you'd be interested in spending a couple of bucks on their classics.

Here are some URLs that should still be up and running by the time you read this. We found these sites via rudimentary searching strategies.

▶ **www.emux.com** You can find almost anything emulation-related here. Really.

▶ **http://mame.retrogames.com** The official home of the Multiple Arcade Machine Emulator, which enables more than 1,300 arcade classics on your PC. Don't miss it.

▶ **www.davesvgc.com** Once a haven for all ROMs under the sun, Dave's Video Game Classics has gone legit. It's now one of the most comprehensive resources for emulators and new development. Dave also hosts the official pages for a number of emulators.

▶ **www.emulation.net** Sure, it's a Mac site, but it can be a good resource for platform-independent files and news on impending ports.

▶ **www.c64.org** Includes a variety of Commodore 64-related emulation sites.

▶ **www.commodorezone.com** A very well-organized site on C64 emulation.

▶ **ftp.apple.asimov.net** An Apple II hangout.

▶ **www.uni-karlsruhe.de/~Marek.Tomczyk/8bit.html** This is the Atari 8-bit Resort, a good launchpoint for Atari 8-bit emulation.

▶ **http://www.codepoet.com/UAE/index.htm** Home of the WinUAE Amiga emulator. ✹

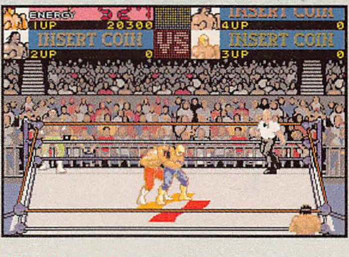
▶ SUPER NINTENDO

Emulate with: ZSnes and SNES 9x

Nintendo managed to squeeze some pretty neat titles out of this 16-bit workhorse before it finished the Nintendo 64.

▶ MAME ARCADE GAMES

MAME is the definitive arcade emulator. It's not quite all-inclusive, but it plays all the games you'll ever need.

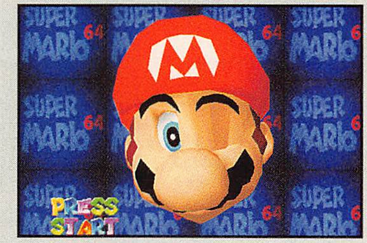


The Main Event The characters are thinly veiled copies of the superstars of the late 80s. The tag team action is, um, realistic, and if you don't get the moves down right away, you can keep pumping virtual quarters into the machine.

▶ NINTENDO 64

Emulate with: UltraHLE, Nemu64, and TRWin

N64 emulation is out of the "purely experimental" phase, but not yet in the "comfortably stable" phase. Serious CPU speed and a solid 3D card are absolute musts, and don't go in with great hopes just yet.

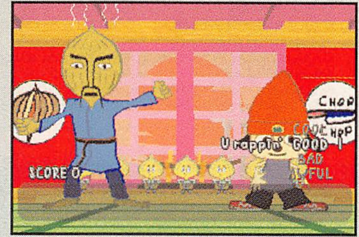


Super Mario 64 They've made Mario look more like Mickey Mouse than the big-nosed, hammer-wielding Italian plumber we remember. But it's still a fun game.

▶ SONY PLAYSTATION

Emulate with: Bleem! (commercial), PSEmu Pro, and PSyKe

The nice bit is that you can play imported and CDR Playstation games without the messy hardware hacking. The emulators aren't perfect yet, but they're well-motivated.



PaRappa the Rapper What a dumb concept for a game. Yet those stupid little rhymes and the goofy dog face and the onion-head teacher and those stupid little rhymes... They all add up to a game that you don't want to stop playing.

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Screenshot of Slave Zero courtesy of Accolade.

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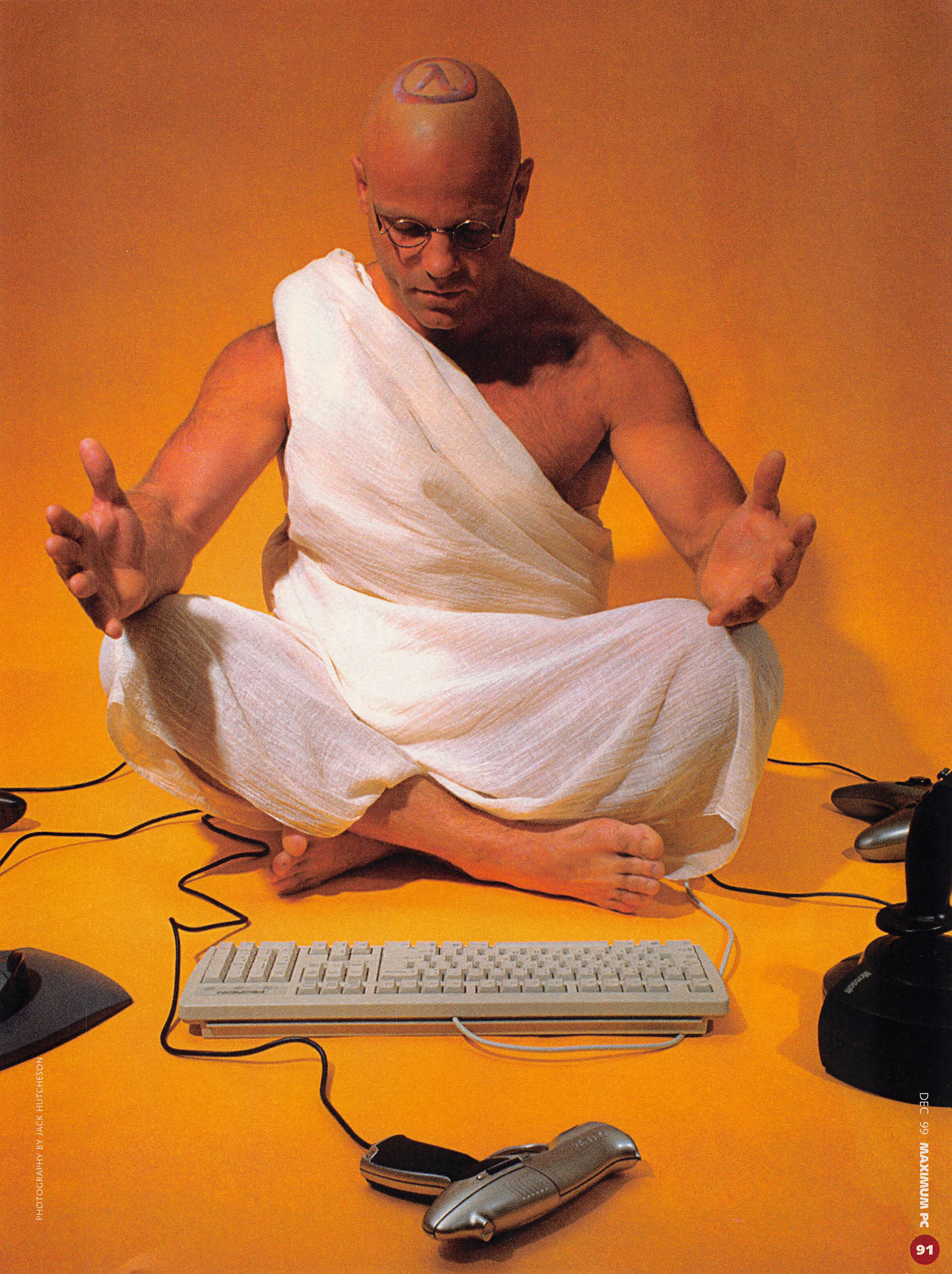
More specifically, how much know-how have you applied to making your gaming experience all it can be? All the hardware in the world does you no good if you haven't mastered your gaming domain. This means digging into a game's options menu and config files to find hidden parameters, mucking with enemy AI routines to find logic gaps, and generally ripping into a game's plumbing to find programming flaws you can exploit.

Use any means necessary to take your game to the next level.

Don't think of it as cheating; think of it as taking full advantage of your game. While you're at it, think of us as game exploitation gurus. We want you to reach framerate bliss, so our optimization tips are specifically designed to squeeze the most out of your games. If you're happy with the way they look and play, by all means leave them alone. But if you want to get the edge in your next multiplayer match-up, or just get consistent performance from your favorite game, open your mind to our collective wisdom.



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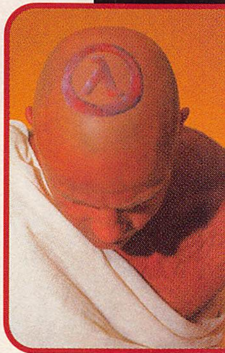


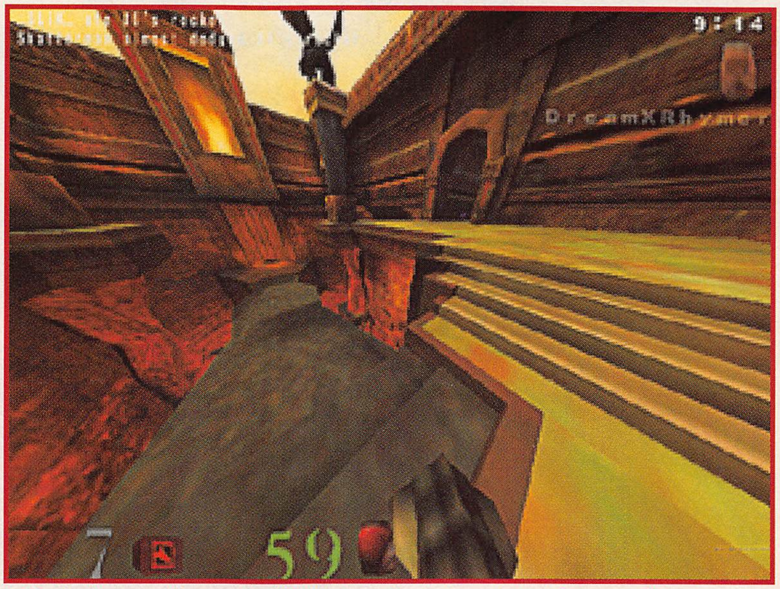
Quake III

To get those framerates in *Quake III* up to top speed, you'll have to change a couple of default options. First, go to the Game Options menu and turn off dynamic lights, ejecting brass, and marks on walls. Dynamic lights are associated with moving objects, such as rockets and plasma balls. Ejecting brass refers to the shell casings that fall from your gun when you fire off shots. Marks on walls show with a procedural texture where your shot hit. In fast-paced deathmatches where rockets are flying everywhere, these fancy-boy effects can eat up tons of processing time.

Now, turn off the 3D icons in your HUD that suck up valuable processing time. Bring down the console (by hitting the ~ key) and type `CG_3DICONS 0`. Next, go to the Graphic Options menu and change the lighting option from lightmap to vertex. It may not look as good as the default lightmap lighting, but you'll see your frames per second take a significant jump.

If you still need more speed, turn off the high-quality sky in the Game Options menu, and dial your geometric detail down to low in the Graphic Options menu. You'll get a few extra frames-per-second at the expense of curved surfaces and a nicely textured sky, neither of which you'll notice in the heat of battle.

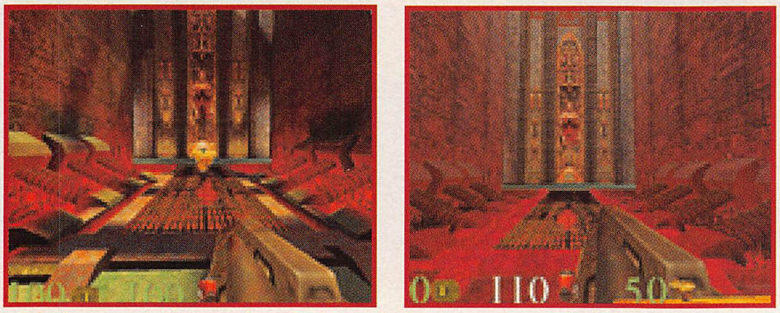
Keep in mind that as your framerates get faster, your multiplayer action could bog down. Playing at 60+ fps can contribute to a poorer online experience because constant player position updates increase packet traffic. *Quake II* required you to limit your FPS by setting CL_MAXFPS to a reasonable value, such as 30; in *Quake III* you can put a cap on packet traffic independently of framerates by typing `CL_MAXPACKETS 30` in the console. Experiment with different values to see what works best.



In Quake III, no one knows what it's like to be the bad man behind fish eyes. This view comes courtesy of an FOV set to 130.

SPIN TILL YOU WIN

Mouse sensitivity is integral to your basic survival in *Quake III: Arena*, since the faster you react, the less you get gibbed, and the higher your frag count will climb. The slide-bar for mouse sensitivity in the Customize Controls panel is pretty much useless, since 30 is the highest setting. That's quite a jump from the default setting of 5, but the true payoff comes when you push the envelope to higher levels. With mouse sensitivity set to 80 or higher, you can spin around and pump lead into anyone trying to give you a rocket enema before they even have time to line up the crosshairs on your butt. To adjust your mouse sensitivity, bring down the console by hitting the ~ key and typing `SENSITIVITY XX`, where `XX` is the value. Start slowly, because immediately cranking your mouse sensitivity all the way up to 90 will only cause motion sickness. Once you've mastered a sensitivity of 30, try pushing it up to 40, get acclimated to the newfound range of motion, then push it up further.



While the vertex lighting on the right doesn't look as impressive as the lightmap lighting on the left, it yields valuable framerates in Quake III.

BROADEN YOUR HORIZONS

If you want to see more of the action in *Quake III*, alter your field of view (FOV). Most hardcore Quakers feel that this is cheating, which it is to a certain degree, but it certainly isn't as egregious as hacking binaries to get unlimited health. With an increased FOV you can see opponents to your left and right—and the more you can see, the more you can frag. You can change the field of view the same way you changed mouse sensitivity: Bring down the console and type in `FOV XX`, where `XX` is once again the value. *Quake III*'s default FOV value is 90, so try bumping this up to the 110-to-120 range. 190 is the maximum, but it's practically impossible to play at that setting; at about 130 your increased peripheral vision causes a "fish-eye" effect that just gets more exaggerated with higher values. Once your field of view is set to a comfortable level, you can lay waste to all that stands in your way, as well as anything lurking on either side.

Descent 3

To get faster framerates in *Descent 3*, go to the Details menu and turn off specular mapping and mirrored surfaces. This will remove the shininess from certain objects, and turn off the reflective surfaces that can suck up

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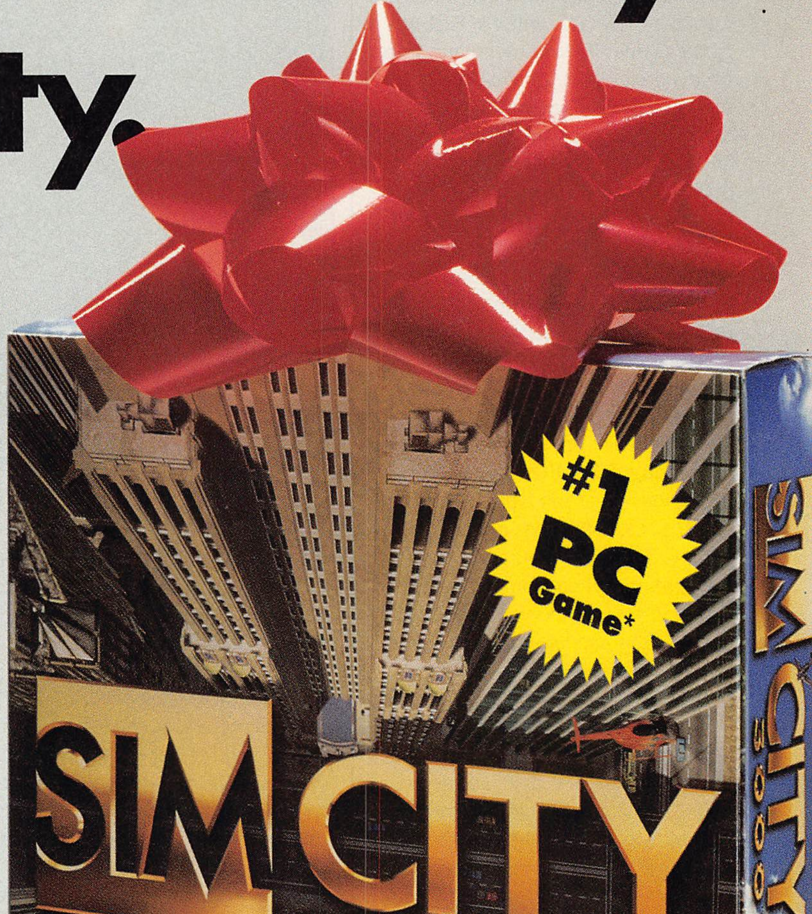

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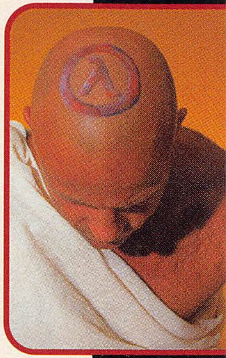


huge amounts of processing time from your videocard. Other than these two options, the most important graphic settings to turn off are dynamic lighting and light coronas. Both are fancy lighting effects that tend to obscure your view anyway. You won't even miss them, and you'll appreciate the framerate increase, especially in multiplayer matches.

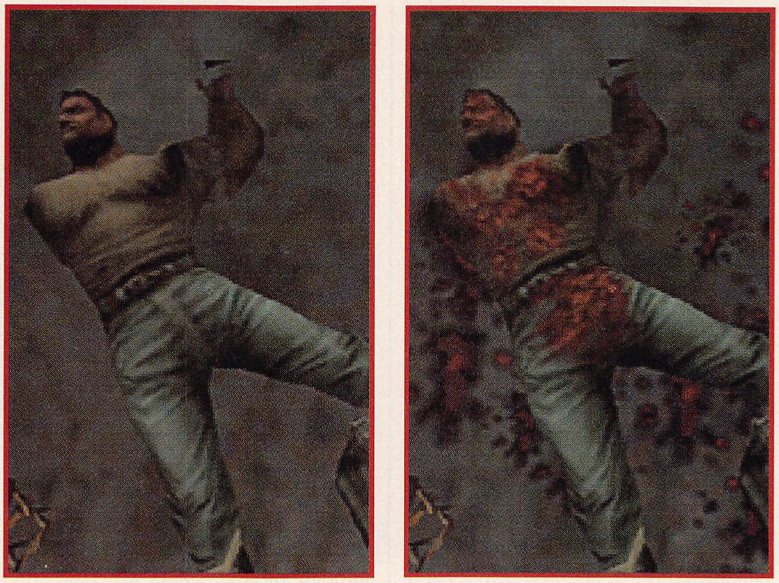
Another D3 trick is turning off rotational velocity in the Multiplayer Options menu. This may make other ships appear to move less smoothly, but it also lessens bandwidth requirements and improves the overall multiplayer experience.

Descent 3 supports both client/server and peer-to-peer networking models. When looking for an online multiplayer game to join, always search for a client/server game running on a dedicated server, since it will be able to handle more players while minimizing bandwidth requirements. Avoid peer-to-peer games like the plague.

Unreal Tournament

You can squeeze out a little extra network performance in *Unreal Tournament* by setting your appropriate connection type (modem, ISDN, or LAN) in the Preferences menu. Don't worry about the stat logging checkboxes; unless you're running a server, this won't make any difference in your play speed. Next, open the Advanced Options menu, go to the Networking options, and look for a line in the TCP/IP Network Play section that reads MaxClientRate. If you have a 28.8K connection, set this rate to somewhere between 2,000 and 3,000. If you connect at 33.6K, try a rate of 3,500. For a 56K connection, use a rate of 5,000. High-speed connections should be set to 10,000 or above.

Kingpin



Kingpin's gore level is scalable, so the extra-splattered blood details don't have to weigh down your morality—or your framerates

To get *Kingpin* running as fast as its *Quake II* engine will allow, you'll have to disable some of the more advanced graphic options that are specific to the game. From the Visuals menu, set the texture quality and pain skins sliders as low as they'll go; say yes to 8-bit textures and no to shadows and fog. Faster systems shouldn't experience any slowdowns from jacking up the texture quality, but always leave fog and shadows set to "no," since these options suck down the most processing time.

As with *Quake III*, turning off dynamic lights yields a significant speed increase. To access the console within *Kingpin*, add the line `DEVELOPER 1` to the autoexec.cfg file in your Kingpin directory. After launching the game, press "~" to bring down the console, then type in `GL_DYNAMIC 0` to turn off dynamic lights. If you still feel the need for speed, head back to the Options menu and set directional lighting to "no."

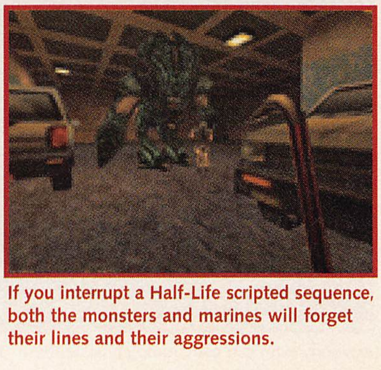
HEALING YOUR THUGS

Kingpin's hired goons are invaluable tools that not only act as human shields, but also have an endless supply of health. As long as he doesn't actually die, a thug can heal his wounds no matter how bad they are—sort of like Rambo. Say, for example, you and two thugs bust into a warehouse and take out all of the opposing gang members. While your AI buddies did a great job keeping stray bullets away from you, they're also standing at death's door. Just tell them to stand in one place, then sit back and do nothing. It takes a little while for the healing to start, but over time, the health of your hired goons will fully replenish. You can use this time to grab a snack or read a page or two of this magazine. After your boys have regained their health, save your game and gear up to take on the next warehouse.

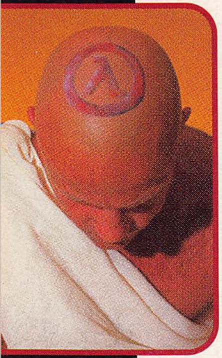
Half-Life

Three settings can drastically affect your computer's performance during *Half-Life* multiplayer: pushlatency, rate, and fps. The secret is finding the right values for your connection. Rate is the most important, since it determines the rate at which the server sends packets to you. If your rate is too high or too low, you'll experience lag. You can find the current packet rate by bringing down the console and typing `RATE`. The default rate setting is 2500; if you have a cable or DSL connection, you'll see a huge improvement if you bump the rate up to around 8000. Just type `RATE 8000` in the console to change the value.

The pushlatency setting controls the way your computer predicts the positions of all objects on the screen.



If you interrupt a Half-Life scripted sequence, both the monsters and marines will forget their lines and their aggressions.



The default pushlatency setting of –500 is totally whack, since pushlatency should always be negative the value of your ping. Opening the console and typing `PUSHLATENCY –XXX`, where `XXX` equals your average ping, changes this value.

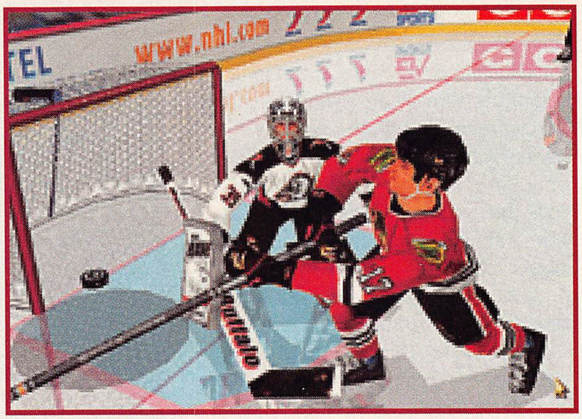
The FPS setting can cap your framerates at a reasonable number, such as 30. This allows your videocard and CPU to more reasonably work together to speed up the game. For modem users with a rate setting above 5000, the console command is `FPS_LAN`; for those with a rate setting below 5000, it's `FPS_MODEM`.

THROWING OUT THE SCRIPT

Toward the end of the single-player level Surface Tension, you enter the parking garage to find two marines and a Gargantuan waiting for you. It's here that a nifty little scripting bug turns the marines and the Gargantua from fearsome opponents into idle bystanders, but you'll have to act fast. In the two seconds that elapse before the Gargantua squashes the marines with an SUV, pepper the marines with bullets from your MP5. This will cause them to scatter, as they are programmed to do. The Gargantua will still push the truck up against the wall, but since the marines aren't there to be squashed, the whole script comes crashing down. Without the script, Gargantua and the marines will just stand there, wondering what to do next.

CONC JUMPING

The single most effective offensive technique in *Half-Life Team Fortress Classic* is known as the "conc jump." It involves using the forward momentum released from a detonated concussion grenade (carried by scouts and medics) to launch yourself into otherwise impossible to reach places, and to move across the map rapidly (when, say, carrying the enemy's flag). The most basic conc jump is performed by priming the concussion grenade, throwing it on the ground, and jumping on it as it goes off. Since the grenade detonates in three seconds, you'll need to position yourself so that the blast will knock you up and forward: Jump over the grenade, facing the direction you want to be launched. If you jump too early, the blast will knock you either straight up or backwards. If you're too late, it will launch you horizontally across the map (which can also be effective on maps with indoor hallways, such as Rock2). Time it just right and you'll fly as far as the map allows.

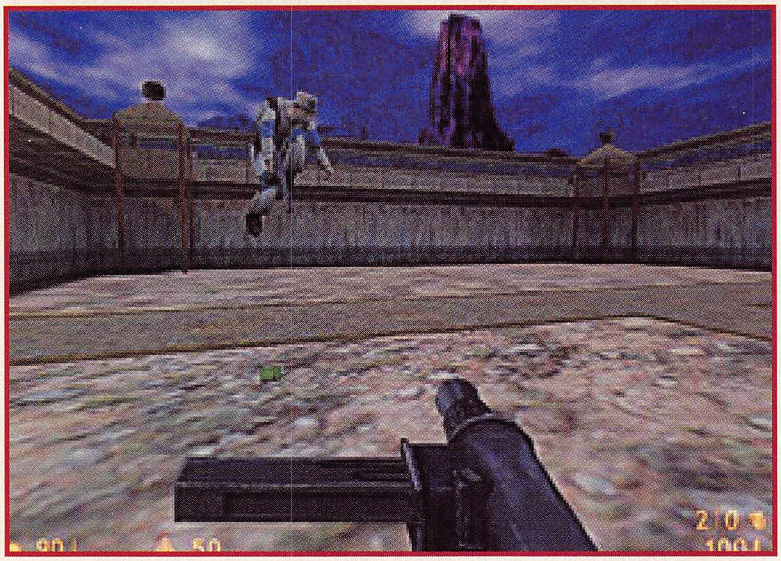


Hasek, shmasek. Master the breakaway move in NHL 2000 and you will dominate the Dominator.

Random Tips

SURE-FIRE SCORING IN NHL 2000

If you're looking to post big numbers against the computer in *NHL 2000*, remember one key concept: Speed kills. Stock your team with speedsters and you're guaranteed to get a ton of breakaways in every game you play. And with the help of one simple move, breakaways always end in a goal for your side. Put on the jets and head up the middle of the ice, directly at the opposing goalie. Line up just slightly off-center, a few pixels towards the opposite side of your player's shooting hand, and skate all the way in on goal. When your guy is about to enter the crease and barrel into the goalie, thumb the D-pad towards the side that will put your shooter on his forehand (the right side if your guy is a right-handed shot, vice-versa if he's a lefty) and hit the shoot button. This move alone almost always decks the goalie out of his jock, resulting in an easy goal for your side. Practice it in the game's shootout mode, and then plaster your buddies with it in head-to-head matches. Once you master this move, you'll have difficulty scoring fewer than ten goals a game.

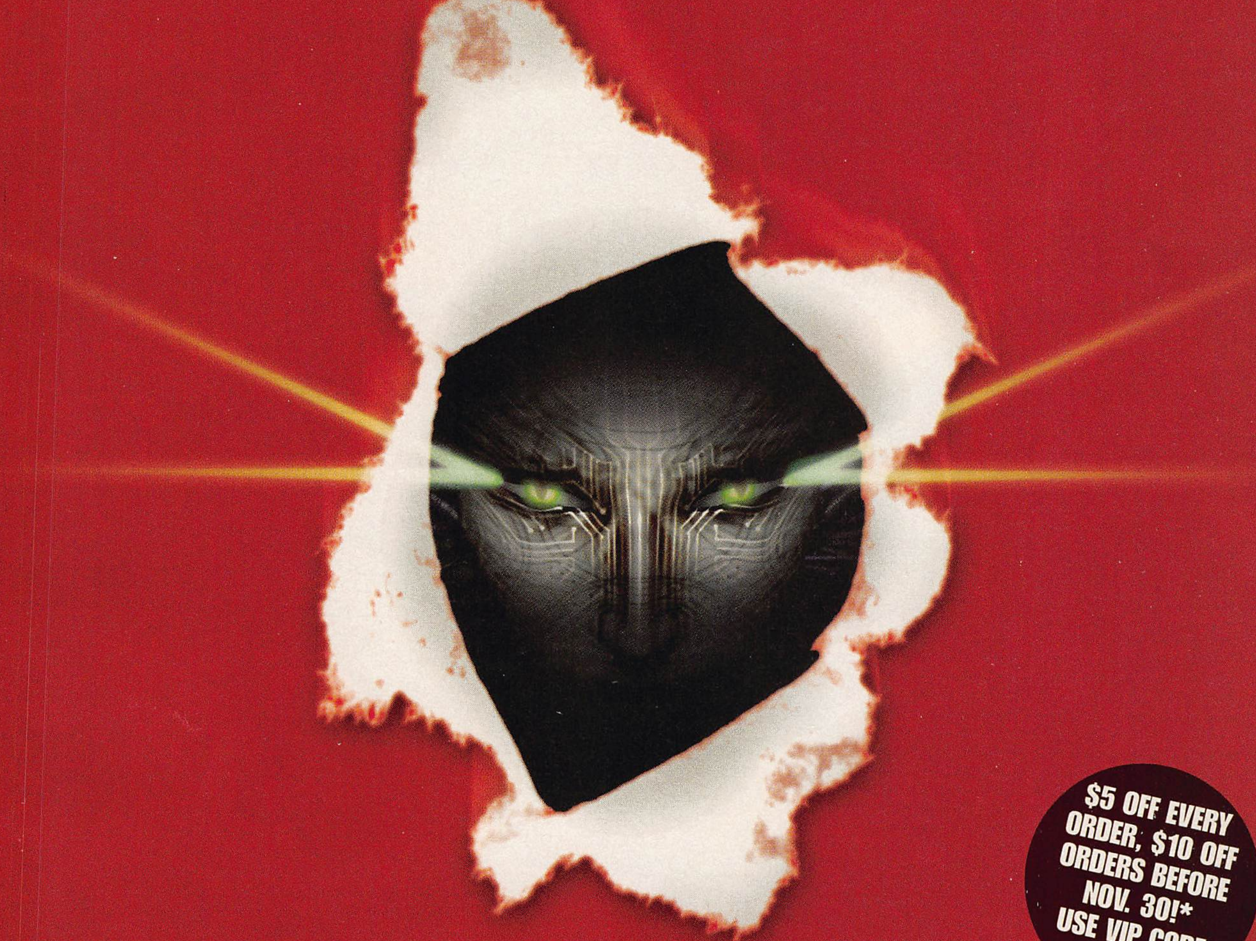


Anybody who can conc jump consistently in Team Fortress is a force to be reckoned with.

MEDIEVAL STOCKPILING IN AGE OF EMPIRES II

The original *Age of Empires* allowed players to concoct bizarre situations, such as creating a prison by walling in a defeated foe's town center, using a priest to convert one prisoner, and then watching the rest of the population stone him to death. Thankfully, the sequel yields even more entertaining quirks, including a new garrison-troops feature that can be exploited to create devastating blitzkrieg tactics: Send some workers over to build a tower on the shore near an enemy encampment. It's best if the enemy lacks the firepower to immediately

In real life, SHODAN would make the y2k bug seem like a harmless pest.



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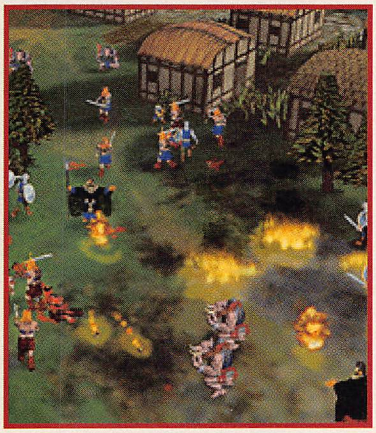
blast your tower, because you'll need to keep back attacking forces until all of your men are in place. Now, load wave after wave of troops into transport boats, and fill your tower to the brim with your most deadly forces. They'll be safe and snug, drinking hot cocoa and singing campfire songs until you command them to put on a sudden, vulgar display of power that'll leave the sleepy seaside town reeling.

HIT AND MYTH

Many enemy platoons in *Myth* have limited activation ranges. You can sometimes run your archers close enough to attack, then run away quickly and watch the enemy units return to their original positions. While they pace, uncertain as to whether they should attack you or not, you can do massive hit-and-run damage.

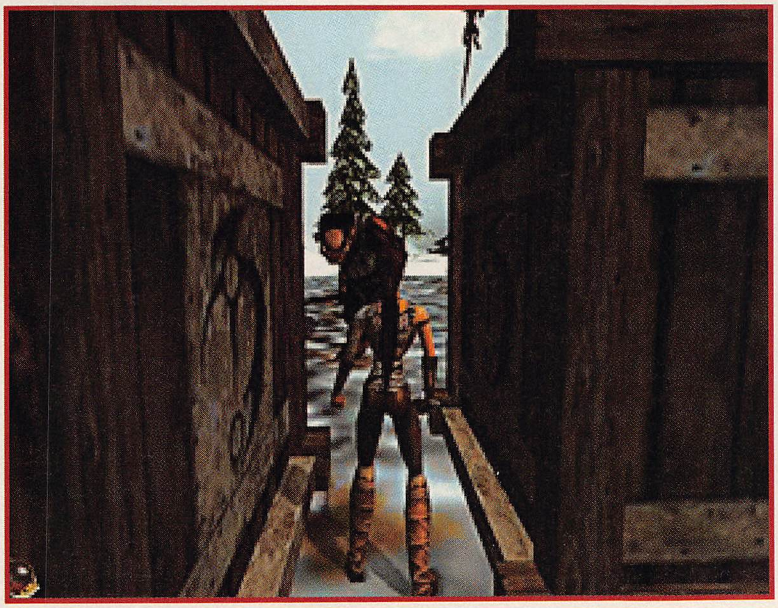


To successfully hit-and-run in Myth II, target the Warlock's feet.

The AI and scripting in *Myth II* are much more sophisticated, but there is a trick you can employ. *Myth II*'s Warlocks, and to some extent *Myth*'s Dwarven Heroes, decide by a fairly simple technique whether someone is in their range of attack—a technique that does not allow them to predict when someone is nearly in range and moving closer. During Warlock battles, use this to your advantage by targeting the ground in front of an enemy Warlock as you walk towards it. By the time the AI realizes that you're in range, you'll already have launched your fireball and beat a hasty retreat.

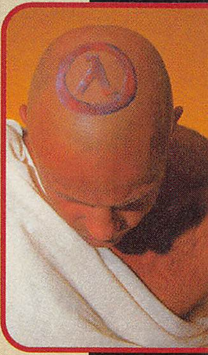
HIDING BEHIND OBJECTS IN DRAKAN

As of press time, *Drakan* has been on store shelves for only a few weeks—hardly enough time to root out a litany of tricks and tips. However, we have discovered that opponents are amazingly unable to maneuver around vertical objects, or to advance at angles less than 90 degrees. This allows you to hide behind almost anything that sticks up from the ground, including small boxes and skinny trees. In hand-to-hand combat, use this AI flaw as much as possible. Just duck behind boxes or trees and lash out at the lumbering beasts while they stand there stupidly, wondering why they can't walk around the tree or stick their sword between the boxes to stab you. Honorable? Probably not. Effective? Definitely. ✹



This Drakan baddie can see you, but he's too stupid to do anything about it.

The Unbearable Lightness of Ping



As any online gamer soon discovers, ping is king. If you continually suffer from a high ping, online gaming is a frustrating experience during which you get your ass kicked repeatedly until your connection stops responding and you begin to cry. In order to understand why the ping gods are either smiling or pissing on you, it's important to understand what ping is, what factors affect it, and what you can do to make it better.

Ping stands for Packet INternet Groper. It was developed as a utility to determine the accessibility of specific IP addresses, which it does by sending a single packet of data to the specified address and waiting for a reply. The time it takes the packet to return, measured in milliseconds, is known as your ping time. Generally speaking, a ping of between 250 and 300 is acceptable for online play, though lower is always better.

During online gaming, your computer is constantly sending and receiving packets of information, constituting the actions of you and the other players onscreen. Once the packet leaves your PC, it travels through a series of routers, or hops, with a typical packet coursing through between five and 40-plus hops before reaching its final destination. The fewer hops your data goes through, the better, since the further a packet goes, the more likely it will be misplaced, corrupted, or held up. The result of too many hops is the dreaded L word—lag.

The best way to determine the number of hops your packets are taking is to use the Uotrace utility included at the root of this month's Maximum CD. Uotrace is an excellent tool for helping you determine exactly where the problem with your connection lies.

In addition, most current games allow you to tweak settings that allow for smoother Internet play. Two of the most common are Rate, which controls the amount of data the server is sending to your PC, and Player Prediction, a.k.a. pushlatency, which tries to offset lag by predicting player movement.

MY BROTHER IS A VICTIM OF BAD GRAPHICS.
MY SON IS A VICTIM OF BAD GRAPHICS.
NVIDIA
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Don't worry, at NVIDIA, amazingly fast, cutting-edge graphics processors are all we do. The results are ultra-smooth frame rates and incredibly vivid colors that allow you to see and play 3D/2D games exactly the way game makers intended. Not to mention an Internet experience that comes to life. If you demand this kind of performance out of your games and the Internet, then demand your next PC or graphics accelerator comes loaded with a NVIDIA chip. There's no reason to settle for anything less. Graphics to the nth degree.

graphics^n

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Hardware Detective

HOW TO IDENTIFY OLD HARDWARE

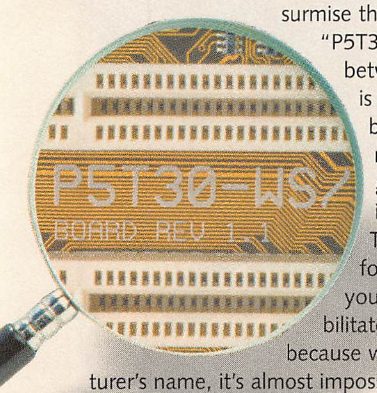
A dusty box of old hardware was unearthed this morning in The Lab. Authorities found the box lying face down in a corner beneath a pile of old joysticks and packing material. None of the moldy hardware appeared to be accompanied by drivers or documentation; some was even devoid of labels indicating a manufacturer's name. Investigators have tentatively labeled the components "junk," and, pending contact from any parties interested in claiming the hardware, plan to quietly discard it in the Dumpster located in the Imagine Media parking lot.

The computer industry is driven by the latest and greatest, but just because a card, motherboard, or memory chip has fallen out of favor with the industry doesn't mean you should leave it for dead. Consider breaking out a flashlight and magnifying glass and playing hardware detective—because to the trained eye, what appears to be a box of worthless hardware can become a heist of useful components. With the handy tips we give you here, you should be able to put a name to almost any legit piece of hardware. Once you have model names and numbers, you can look for cooling requirements and all the spec info you'll need to rehabilitate and upgrade your hardware booty.

—Gordon Ung

Motherboards

John Doe No. 1 is a no-name Socket 7 motherboard with onboard SCSI. Veteran investigators know that motherboards are among the most difficult devices to identify unless you look in just the right places. To conduct a proper motherboard autopsy, first remove the mobo from the case. Once you've got the board out, examine it under a good light source for any kind of identifying marks. Lilliputian print on our John Doe No. 1 indicates that the board was born in Taiwan and that it is a Rev 1.1 board. We surmise that the tattoo "P5T30-WS/A4" located between the PCI slots is its model number, but we can locate no other distinguishing marks indicating its origin. This is a bad sign for cases in which you're hoping to rehabilitate the old board, because without a manufacturer's name, it's almost impossible to get a hold of the drivers and BIOS updates needed to run the latest processors and correct bug fixes.



Our investigation turns to the Internet for some serious gumshoe work. We use one of the more powerful search engines, Alta Vista, to search for the numbers we've found on the motherboard.

Since it resembles an FCC ID, we also check the FCC database for the "QEC" number. Any companies building devices that emit radio frequencies must register with the Federal Communications Commission and receive a unique ID to label their hardware with. You won't find keyboards or mice in the FCC database (unless they're wireless), but you will find hardware such as monitors, soundcards, and motherboards. For equipment made after 1998, try **www.fcc.gov/oet/fccid**. For hardware made before 1998, use **www.fcc.gov/fcc-bin/ead**.

Unfortunately, the FCC database garners us no new leads.

We decide to run another web search for another number found on the board, "P5T30." That search yields several leads. Following a few links leads us to **ww.tkramusa.com**. Bingo. The site offers the motherboard's manual, jumper settings, a BIOS update, and information indicating that the board supports Pentiums up to 233MHz, as well as AMD K6 and Cyrix 6x86 procs up to 233MHz.

Remember to try several different iterations when searching for a part's model number. First, search for numbers exactly as they appear on the part. Then, try searching for just the first few letters, paying careful attention to such things as dashes and spaces. Also search the Usenet, and utilize metasearch agents such as Copernic (**www.copernic.com**) and Dogpile (**www.dogpile.com**), which scour multiple search engines at once.

If your Internet searches come up empty, it's time to examine the board's BIOS boot screen. Like a person's social security number, motherboards are assigned unique numbers that tell you where they were born. You can find these numbers in the BIOS screen.

To boot your board, insert it into a case along with a processor, RAM, and videocard. If the board is AMI BIOS-based, fire it up without a keyboard, or hold down a key while booting; your monitor screen should display a "keyboard error" message, and the boot-up should halt. On the lower left-hand side of the screen you should see a very long BIOS string, such as "51-0102-001114-00111111-101094-AMIS123-P." Write down the last four digits of

Your personal tech briefing on the concepts and components that comprise the PC experience.

the third series of numbers ("1114" in our example). A search for those numbers on AMI's web site (**www.ami.com**) yields the information that the motherboard's manufacturer is Iwill.

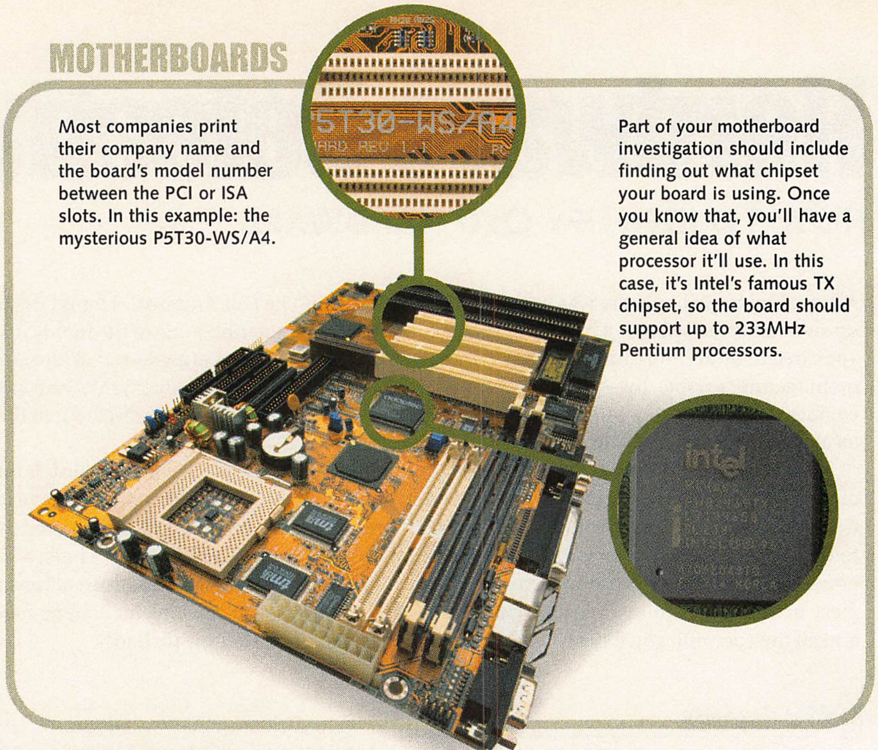
For boards with the Award BIOS, hit the "pause" key as the machine is booting, and write down the string of numbers that appears in the lower left-hand side of the screen; the sixth and seventh digits indicate who made board. A full list of manufacturers is located at **www.phoenix.com/pcuser/bios-award-vendors.html**.

If you've got a Phoenix BIOS, such as those used in the popular Intel motherboards, you're out of luck. Phoenix doesn't make its hardware vendor list available to the public.

Once you've figured out who made the board, start searching for that company's web site—a process that's sometimes more difficult than finding out who made the mobo in the first place. Consult the web site **motherboards.org**, which maintains a healthy list of motherboard makers, and Wim's BIOS page (**www.ping.be/bios/**), which offers a very current list of AMI and Award BIOS ID strings.

If you've exhausted these options, consider posting a message on Usenet that contains the information you've gathered so far, and a picture of your John Doe motherboard. Someone may have already done the detective work for you. Luckily, the case of our John Doe No.1 has a happy ending. The P5-T30 has begun a new life in an undisclosed area of Southern California.

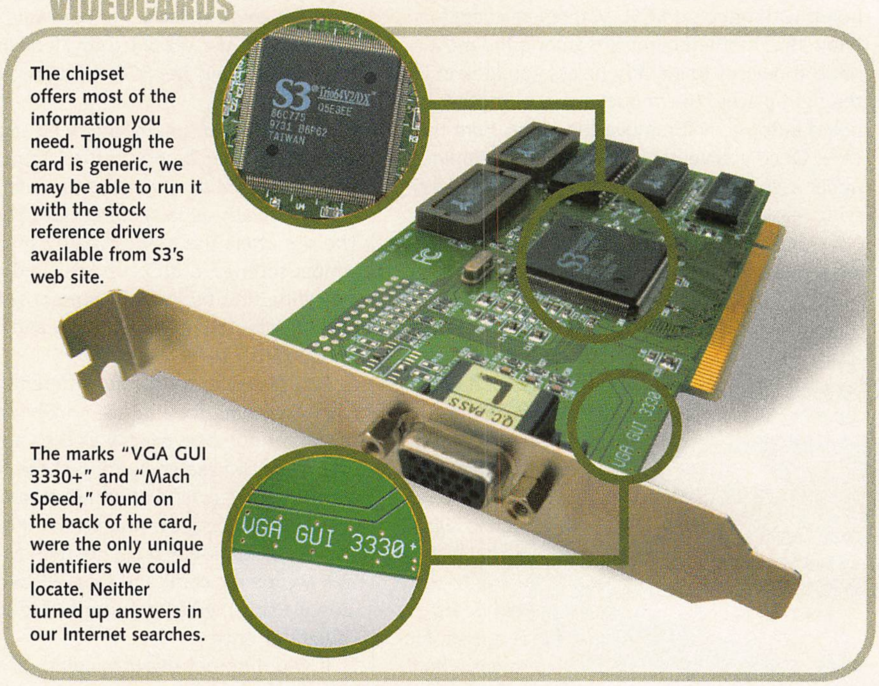
MOTHERBOARDS



Most companies print their company name and the board's model number between the PCI or ISA slots. In this example: the mysterious P5T30-WS/A4.

Part of your motherboard investigation should include finding out what chipset your board is using. Once you know that, you'll have a general idea of what processor it'll use. In this case, it's Intel's famous TX chipset, so the board should support up to 233MHz Pentium processors.

VIDEOCARDS



The chipset offers most of the information you need. Though the card is generic, we may be able to run it with the stock reference drivers available from S3's web site.

The marks "VGA GUI 3330+" and "Mach Speed," found on the back of the card, were the only unique identifiers we could locate. Neither turned up answers in our Internet searches.

Videocards

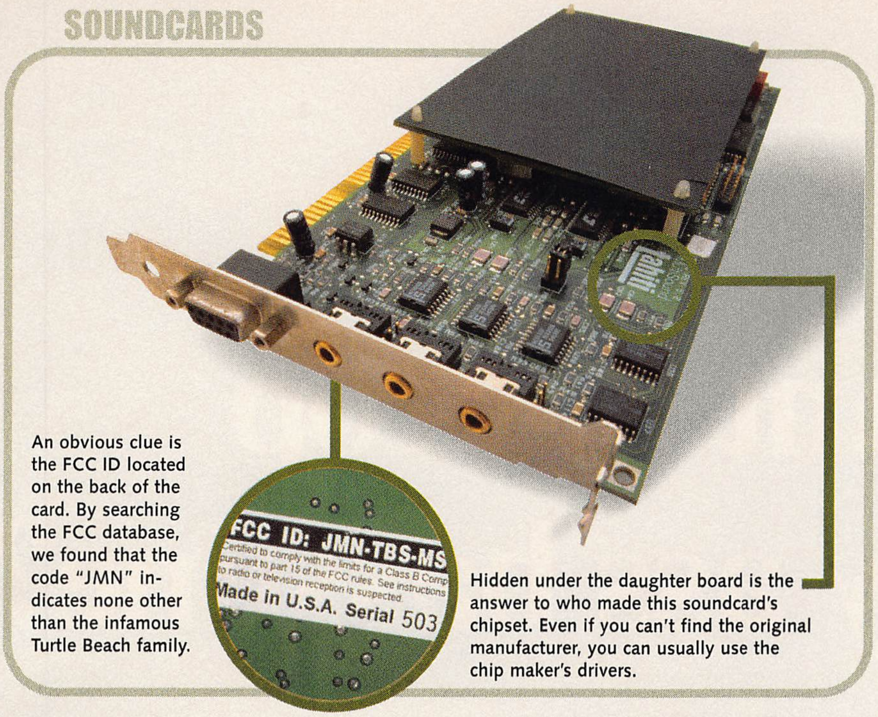
While almost 90% of unidentified hardware cases involving videocards are solved, our John Doe No. 2 is a tougher nut to crack. Most graphics cards come from good homes and bear clear identifying marks, but our John Doe board falls into that 10% category that have almost no marks—usually because they came from the wrong side of the tracks. No. 2 bears only the marks "Mach Speed" and "VGA GUI 3330+." Our Internet searches turn up zilch on both.

Our first attempt to solve John Doe No. 2's case involves querying the card with PCIINFO.EXE (available on Miro Wikgren's site, **www.miro.pair.com/tweakbios/**), a program that checks for the manufacturer of each PCI card in a system. Unfortunately, this attempt yields more of the same: The report states only that the card is "Mach Speed,"and that it was made by S3. If PCIINFO.EXE had returned more info, we could have looked up the information on the PCI Special Interests Group's web site (**www.pcisig.com/membership/vendors/index.html**).

Our next step is to check the graphics chipset. If your unknown has a heatsink covering the chipset, you'll have to remove it in order to begin your investigation. We found that our victim is based on S3's Trio64/V2/DX chipset. In some cases, that's all the information you need in order to get the latest reference drivers from the chipset manufacturer's web page. But our John Doe needs a BIOS patch, so we're looking for drivers directly from the board's manufacturer, because running the wrong BIOS update on a part is as good as putting a bullet in its head.

Since our card cannot be identified and is probably older than Senator Strom Thurmond, we've opted to retire John Doe No. 2 to the unsolved cases bin.

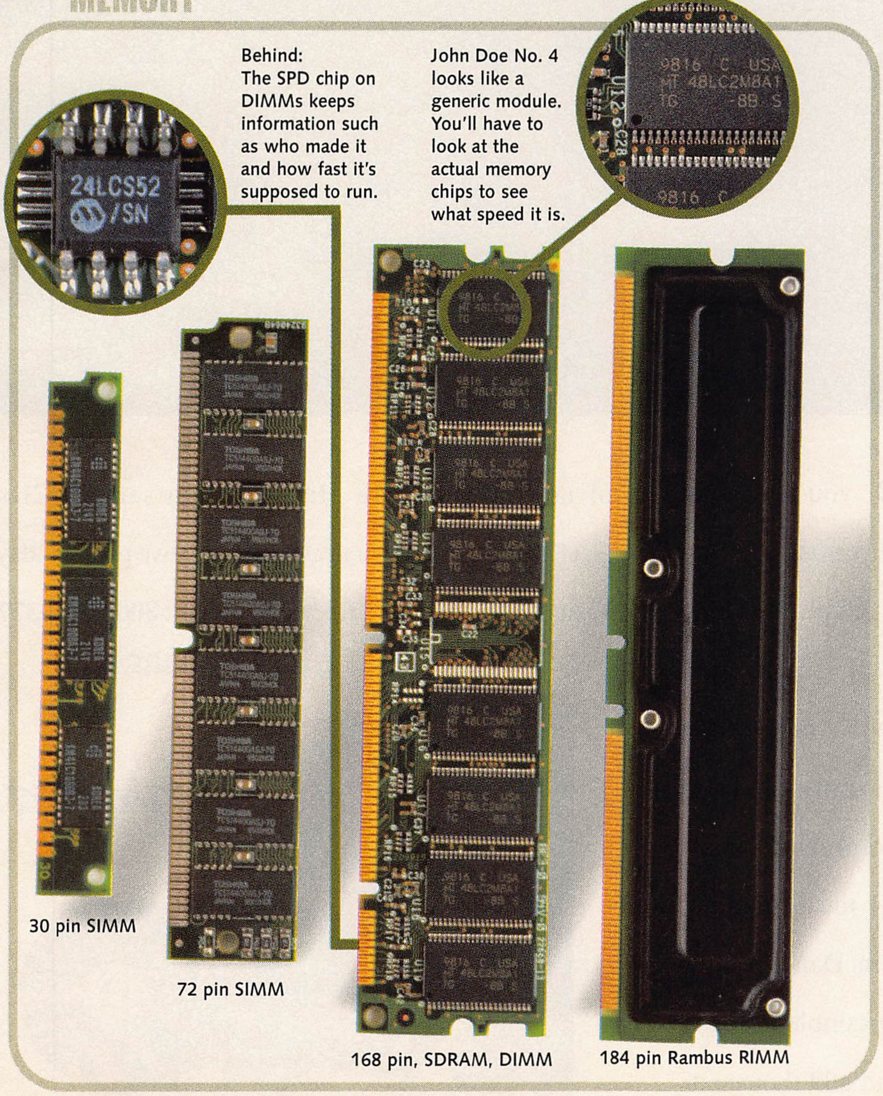
SOUNDCARDS


Tahiti
FCC ID: JMN-TBS-MS
Certified to comply with the limits for a Class B Comp
pursuant to part 15 of the FCC rules. See instructions
to radio or television reception is suspected.
Made in U.S.A. Serial 503

An obvious clue is the FCC ID located on the back of the card. By searching the FCC database, we found that the code "JMN" indicates none other than the infamous Turtle Beach family.

Hidden under the daughter board is the answer to who made this soundcard's chipset. Even if you can't find the original manufacturer, you can usually use the chip maker's drivers.

MEMORY



Behind: The SPD chip on DIMMs keeps information such as who made it and how fast it's supposed to run.

John Doe No. 4 looks like a generic module. You'll have to look at the actual memory chips to see what speed it is.

30 pin SIMM

72 pin SIMM

168 pin, SDRAM, DIMM

184 pin Rambus RIMM

Soundcards

Soundcards, like videocards, tend to come from higher-class backgrounds; the soundcard industry is smaller and less exotic than the motherboard industry. We took a doughnut break and returned confident that we could crack the case of John Doe No. 3.

Our soundcard example is ISA-based. Distinguishing marks are hidden behind a black-backed daughter card that we could surgically remove but have decided not to, because ample evidence exists elsewhere on the card. A "Tahiti" tattoo tells us it is a known member of the Turtle Beach family. Though we'd seen no bulletin on a missing Tahiti card, we were sure a search for "soundcard" and "Tahiti" would yield results. Then we spotted another clue: an FCC ID, "JMN," on the back of the card. Most older soundcards, and even some newer ones, carry FCC ID numbers. A search of the FCC database conclusively fingered Turtle Beach as the card's manufacturer. Armed with a positive ID on our soundcard perp, we visited Turtle Beach's web site to download drivers and documentation. Case closed.

Memory

We didn't expect to identify John Doe No. 4; memory almost always comes from the wrong side of town. Hundreds of thousands of unidentified memory sticks are in circulation, and most will never be identified. Our John Doe No. 4 reports that it is simply PC100; no serial number or manufacturer information are apparent.

One of the easiest ways to find out who made your DIMM is to get DIMM_ID from VML (**www.vml.co.uk**). DIMM_ID will interrogate your memory and report back on its size, speed, and serial number, and the name of the memory module manufacturer. Don't rely completely on what it says, though; it works only on Intel chipsets, and some investigators have reported flaky results.

To conduct a proper autopsy, yank the module out of the case and examine it carefully. The best you can hope for is to identify who made the memory chips. In our case, the chips' "MT" tattoo tells us Micron Technologies made them; the notation "48LC2M8A1-8B" is likely a serial number. Micron's web site (**www.micron.com)** tells us the chips are obsolete, but still true PC100 chips that support 125MHz timing.

Who gave birth to John Doe No. 5? We'll never know. But even without the proper credentials, John Doe No. 5 is still contributing to society, and working in a PC in Brisbane, California. ✱

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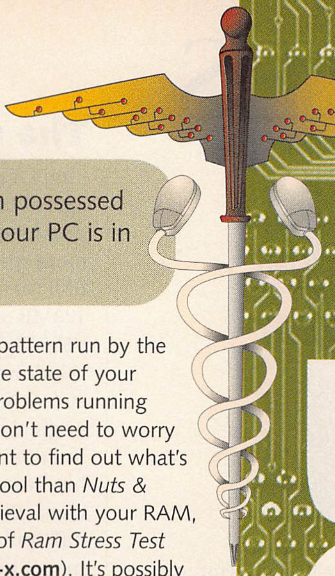
ASK THE DOCTOR



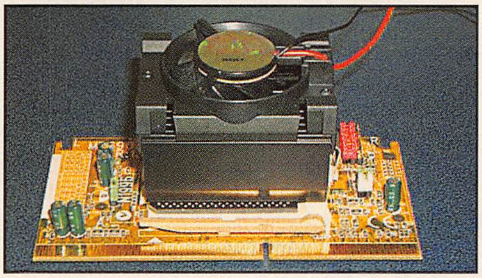
Symptom | Diagnosis | Cure

We love our PCs, but sometimes the little beige bundles of joy seem possessed by Satan (or Bill Gates). Don't worry; the Doctor is here to help. If your PC is in need of an exorcism, let us know at **doctor@maximumpc.com**.

A Celery for Your Slot

I have a Gigabyte 440LX motherboard and was wondering whether I can upgrade to a Slot 1 Celeron. I think I can, because Celerons use the 66MHz bus. If I use a "Slocket," or Socket 370-to-Slot 1 adapter, I should be able to use the 466MHz and 500MHz Socket 370 Celerons, right?

—*Jonathan Sarasin*



Slocket converters allow Socket 370 Celerons to slip into Slot 1 mobos.

You are correct, young overclocker. Since your motherboard uses the older Slot 1 architecture, you have two choices: Buy a Slot 1 Celeron 300A, or buy a Socket 370 Celeron 400MHz, 466MHz, or 500MHz and use a Slocket converter. But before you take the plunge, consider this: Your motherboard may not support the multiplier required to run a 500MHz Celeron at top speed. Older motherboards may not have access to the 7.5 multiplier needed to get your 66MHz baby up to 500MHz (7.5 x 66 = 495). On another note, be sure to update your BIOS, and take extra care when flashing it.

> **"Your motherboard may not support the multiplier required to run a 500MHz Celeron at top speed."**

Tonight on Fox: When RAM Goes Bad

I recently built my own computer and decided to run the PC Checkup module of *Nuts & Bolts 98*. The program detected RAM errors and generated the message "Butterfly at (insert memory address here)." Now, I like to think of myself as an experienced computer user, but I've never encountered anything like this before. What exactly is this error in the RAM; how severe is it with regard to my system's stability, reliability, and performance; and what, if anything, can I possibly do about it?

—*Nathan Willis*

The "Butterfly" refers to the pattern run by the memory test to determine the state of your RAM. If you're not having problems running the machine, you probably don't need to worry about it. But if you really want to find out what's wrong, you'll need a better tool than *Nuts & Bolts*. To get downright medieval with your RAM, consider investing in a copy of *Ram Stress Test* from Ultra-X Inc (**www.ultra-x.com**). It's possibly the most comprehensive memory test available.

When running any test, you can ferret out the exact RAM module that's giving you trouble by swapping each module in and out and re-running the memory test. Before you chuck the module that appears to be the offender, check the web site of your motherboard manufacturer for a BIOS update. Changes in the BIOS may actually affect the way your machine addresses RAM.

How S.M.A.R.T. Is My Drive?

How does S.M.A.R.T. work? Is there a utility you run under Windows that monitors the status of your drives?

—*Kevin Post*

S.M.A.R.T. technology was developed in 1995 by Quantum with the goal o increasing hard-drive reliability attempting to predict future device failures. S.M.A.R.T.—Self-Monitoring, Analysis, and Reporting Technology—works to detect problems using internal sensors and software that's installed on the drive. The drive software monitors the internal performance of the drive's motors, media, heads, and electronics, while the external software monitors the overall reliability status of the drive. Reliability status is determined by analyzing the drive's internal performance level and comparing it with predetermined threshold limits. If a problem is uncovered, a BIOS warning is sent to the user, who hopefully has enough time to do a data backup. Of course, S.M.A.R.T. can't predict *all* future device failures, so it should be used as a safety device, not a tool to predict device reliability. Programs such as *Norton Utilities* will keep your disk's health in check at all times, but that kind of background monitoring consumes valuable system resources and can degrade system performance.

This month:

- **Slocket to me**
- **Bunk RAM**
- **S.M.A.R.T DRIVES**
- **ABIT NAUGHTY**

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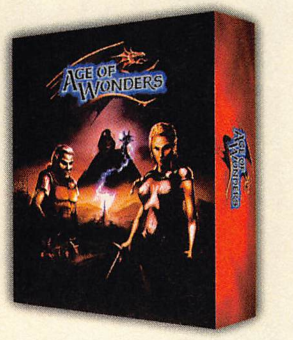


Fans of the classic turn-based strategy game genre will find the epic fantasy escape they've been craving with the upcoming release of **Age of Wonders**. This title from Gathering of Developers puts players in charge of a vast fantasy realm on the brink of an apocalyptic battle.

The story begins in the early days of Earth when a fragile balance of peace exists between all ancient races. The introduction of Humans into this utopian world marks the beginning of violent and bloody times. In its quest to expand and destroy, this new race lays waste to the ruling Elfin court. From the rubble, two factions emerge–the vengeful Cult of Storms and the peace-loving Keepers. The gameplay that follows is an elaborate and engrossing process of strategic posturing in which players make critical decisions involving over 100 different fighting units, 50 unique heroes, captured towns, magic spells and alliances.

The game's cast of thousands includes 12 playable races including Humans, Elves, Frostlings, Orcs, Dwarves and the Undead. Strategic alliances can be forged with compatible races to leverage each race's unique skills and abilities. Other strategic decisions include laying siege to towns and managing resources and huge armies. As the game progresses and characters grow in experience and power, magic becomes a critical element. The game features over 100 spells including attack and defense spells. The realm can be explored with the aid of a highly sophisticated map editor and huge detailed maps including subterranean areas, terrain interaction and dozens of special locations.

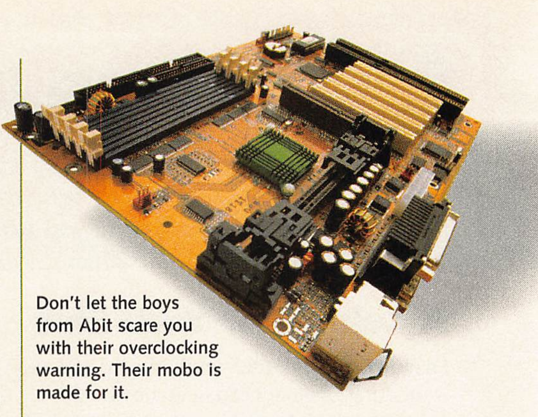
Age of Wonders features Play by E-Mail (PBEM) allowing you to have ongoing battles with your friends at your own pace. For more information or to join a discussion group, visit www.ageofwonders.com. **Age of Wonders** will be in stores nationwide this November. To purchase on-line, visit www.godgames.com.

See our ad for **Nocturne** opposite the *Game Theory* article.

The Need for Speed

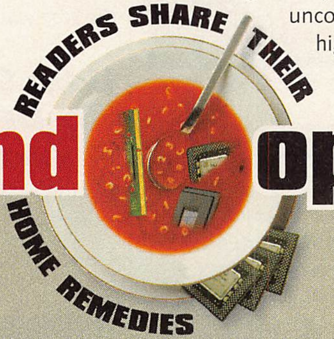
I built a system for a friend a little while ago; at the time it was awesome, but now he wants to overclock the CPU for more speed. The machine has an ABIT BX6 version 1, a 350MHz Pentium II, 128MB of PC100 RAM, a Diamond Viper V550 TNT graphics card, PCI 128, and Windows 98. The problem is that I can't successfully overclock the CPU past the original speed. I can jack it up to 392MHz, but then I get an error that reads, "CPU has been changed or unusable please check the soft menu." I have tried different combinations in the BIOS soft menu, but either I get the above error or the machine defaults to 266MHz in the BIOS soft menu.

—Gary



Don't let the boys from Abit scare you with their overclocking warning. Their mobo is made for it.

Although it's been a while since the Doc has overclocked a BX6 board (brings back sweet memories, though), we recall a Speed Error Hold setting in the BX6 R2 BIOS options that allows you to suppress that "unusable" message. The message is there to remind you that overclocking may result in your CPU melting, a forest fire, a communist takeover, or some other global disaster. Pay close attention to this warning, and consider the consequences of your actions. Then overclock that mutha as fast as you can possibly get it to go. Keep in mind, though, that when the board defaults to a lower speed, it's generally trying to tell you that it's uncomfortable running at the higher speed. ✸



READERS SHARE THEIR HOME REMEDIES

second opinions

Deleting Files Revisited

Nicolas Nicolaou asked about disabling the annoying reconfirmation dialog boxes that appear when you're deleting files. Two ways to stop them are:

1) *PGP 6.X* offers a "wipe" command. It's inserted in the list of commands offered in the right-click-menu, and it will erase files for good after you've dealt with just one dialog box that lists all the files.

2) If you do not wish to use third-party software, you can write a .BAT file containing the line "deltree %1" into your Windows/SendTo directory.

—Miki Noam

Business Ethics and Windows Logon

Most of the time you dispel great wisdom, Doc. But I think you dropped the ball twice in your October '99 column. You came down quite hard on "Tito," the person who wanted to go through his employee's Hotmail account because he suspected she was giving away confidential trade secrets. You suggested he has no heart and is unethical. You are way off base, Doc. He has every right, and in fact even an ethical and moral obligation to his company's owners and shareholders, to make sure that the company is profitable and that valuable trade secrets are not being given away. The other employees should not quit, but instead should be glad that steps are being taken to ensure the company's (and therefore their own) future. Secondly, "Cyrus Ravage" complained that his dial-up adapter wouldn't save his password. Your advice was to leave the password field blank if you don't want to log on to your computer. But in my experience, that is the very thing that keeps you from saving your password! Not having a logon dialog box, or bypassing the logon dialog box by pressing Cancel, will disable the Save Password option in the Connection box.

—Jerry Foster

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ALIENWARE

GAMING MACHINES

GREY

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High-Performance Heatsink/Cooling Fan
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-Boot Magazine

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TESTING POLICY

EDITOR'S CHOICE AWARD: Only 9 and 10 verdicts are even eligible for the coveted Kick Ass award, the mark of PC excellence.

Our product evaluation process is built on down-and-dirty, hands-on testing. All hardware benchmarking is conducted in the *Maximum PC* lab by *Maximum PC* editors, and whenever possible, we use real-world applications to gauge performance. Our final verdicts, which fall on a scale from 1 to 10, are based on both benchmark results and a subjective appraisal of product features.

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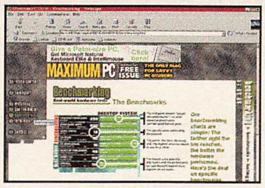
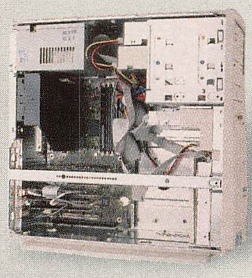


Online Guide to Benchmarking

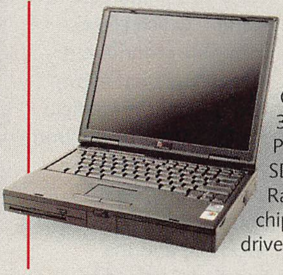
You can always go to **www.maximumpcmag.com/benchmarking** for the complete explanation of *Maximum PC*'s benchmarking policies.

How to Read the Benchmarks

Our Dell Dimension test system is used to establish zero points for all desktop benchmarking and as a test bed for individual component evaluation. The Quantex notebook serves the same purpose for notebook reviews. The base system scores represent the average acceptable performance of high-end machines as of 07/99. We will update the mid-point systems every six months with machines from different OEMs.

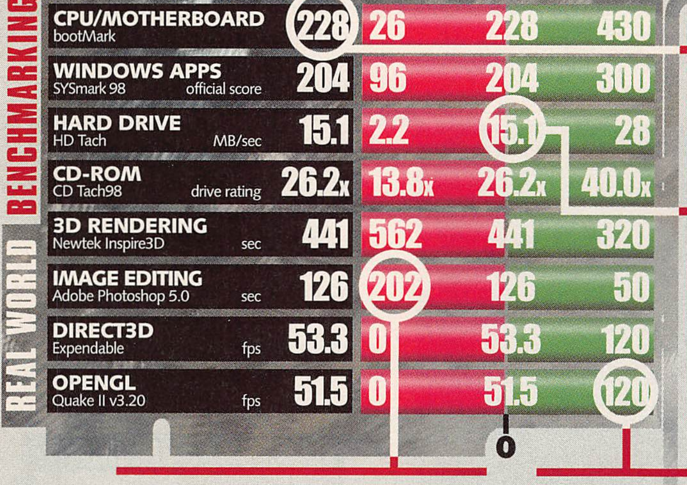


DESKTOP ZERO-POINT SYSTEM: Dell Dimension XPS T500: P-III 500MHz, 440BX chipset, 128MB 100MHz SDRAM, 32MB TNT2 videocard, 12.7GB 7200rpm UDMA/33 hard drive, 40x (advertised speed) CD-ROM.



NOTEBOOK ZERO-POINT SYSTEM: Quantex I-1410: 366MHz mobile Pentium II, 96MB SDRAM, 8MB ATI Rage LT Pro video chipset, 8GB hard drive, 4x DVD-ROM.

Desktop Systems



CPU/MOTHERBOARD bootMark	228	26	228	430
WINDOWS APPS SYSmark 98 official score	204	96	204	300
HARD DRIVE HD Tach MB/sec	15.1	2.2	15.1	28
CD-ROM CD Tach98 drive rating	26.2x	13.8x	26.2x	40.0x
3D RENDERING Newtek Inspire3D sec	441	562	441	320
IMAGE EDITING Adobe Photoshop 5.0 sec	126	202	126	50
DIRECT3D Expendable fps	53.3	0	53.3	120
OPENGL Quake II v3.20 fps	51.5	0	51.5	120

The specific score achieved by the system.

The mid-points denote "acceptable performance" and are based on the precise scores achieved by our base Dell and Quantex systems. As we review new systems each month, their benchmark scores will fall either below or above the mark of acceptable performance.

The more a system underperforms the mid-point system, the further into the red its bar moves. The numbers shown at the low-point are the lowest scores we expect to see in any shipping product.

The more a system outperforms the mid-point system, the further into the green its bar moves. The numbers shown at the high-point are the best scores we expect to see in the next six months.

REVIEWS

KICKIN' THE TIRES ON THE LATEST HARDWARE AND TAKIN' THE LATEST SOFTWARE OUT FOR A SPIN

Hardware Photography by **AARON LAUER**

Alienware Area 51

THE TRUTH IS IN HERE

MAXIMUM PC KICK-ASS! product

Area 51 is the fastest PC we've ever seen, bar none, so shouldn't the U.S. Army classify it as a "supercomputer"? We sure as hell think so. It doesn't take a paranoid FBI spook to figure out that in the face of the Area 51's brute muscle—a 700MHz Athlon processor augmented by the 256MB of PC133 SDRAM—all of our system benchmarks would fall to their knees.

And like swooning males in the arms of Agent Dana Scully, fall they did. SYSmark? Say hello to a new record of 294. bootMark? How does 336.8 grab ya? Even *Photoshop*—which for reasons unexplained is greased for Intel's SSE extensions, but not AMD's own 3DNow! technology—fell victim with a time lapse of only 86 seconds. Ditto for *Inspire*, which completed our image-rendering test in a scant 349 seconds, breaking the old record by approximately 10%. And thanks to the inclusion of Guillemot's 3D Prophet, which itself is powered by 32MB of SDRAM and nVidia's GeForce256 chip, the Area 51 also managed to smack the crap out of *Expendable* and *Quake II*, our trusty Direct3D and OpenGL tests.

Is there any reason *not* to reward the Area 51 our coveted Kick-Ass award? Well, no, especially when you consider that its Addtronics 6890A case has two heat vents, a security lock, and swing-open side doors that make breaking and entering into the chassis nothing more than a minor misdmeanor. You'll be itchin' to get inside and take a peek at the Microstar 2x AGP motherboard, which features five PCI and two ISA slots, and three DIMM slots capable of holding up to 768MB of PC133 memory. Those wacky Alienware cats also equipped the case with a 3.5-inch fan, aptly named KoolMaxx, that provides extra chill for the videocard.

Alienware ups the audio-package ante with Creative's primo Platinum edition, which comes with a front-mounted "DriveBay" that allows you to connect multiple audio devices to the front of the PC. Of course, a great soundcard is nothing without good speakers, and the bundled Cambridge Soundworks' DTT2500 DeskTop Theater System—a digital sound system that harbors a Dolby Digital decoder amplifier—is awesome. Same goes for the Hollywood+ MPEG decoder card and Pioneer 10x DVD-ROM drive.

The only thing not super about the Area 51 is its removable storage options. Oh sure, the Zip 250 is sweet, but an optional $229 CD-R would've been even sweeter. Still, you've got to appreciate the bundled NIC card, which makes setting up your home network (or cable/DSL modem) a proverbial piece of cake.

With its punchy performance and components that we'd gladly sell our soul to keep, the Area 51 is truly out of this world. Just beware of those mysterious men in black.

—Bryan Del Rizzo

Alienware's Area 51 kicks some serious alien butt. Prepare to be blown away.

PLUSES

- 700MHz Athlon
- Gobs o' memory
- Great case design
- Killer soundcard
- Awesome DVD video
- Cool cooling

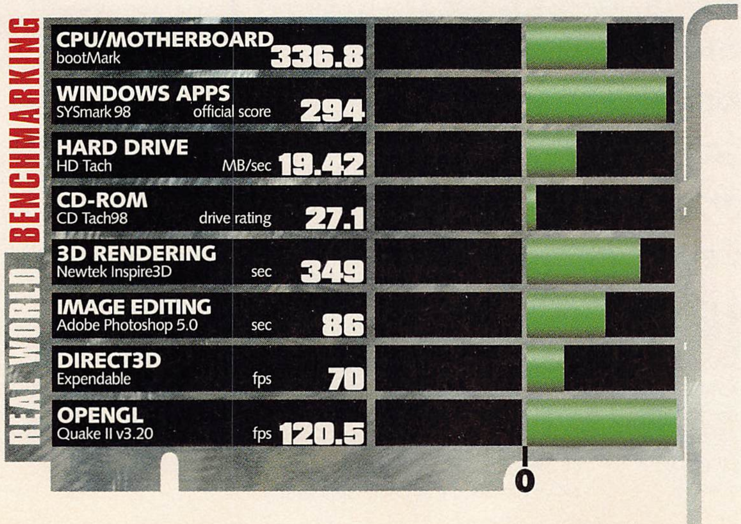
MINUSES

- No CD-R

UNDER THE HOOD

THE BRAINS	
CPU	700MHz AMD Athlon
L2 Cache	512K pipeline burst L2 cache half-speed
RAM	256MB PC133 SDRAM (expandable to 768MB)
Motherboard	Microstar MS-6167 with AMD Northbridge and Southbridge chipset
Drive Bays	Four 5.25-inch (one free), one 3.5-inch (none free)
I/O ports	One parallel, two serial, two USB, two PS/2, TV-out, VGA-in, VGA-out, S/PDIF-in, S/PDIF-out, MIDI-in, MIDI-out, two line-in, two line-out, headphone-out
DISPLAY	
Video	Guillemot 3D Prophet with nVidia's GeForce256 and 32MB SDRAM
Monitor	Optional 19-inch Viewsonic PT795, 18-inch viewable, 0.25mm aperture grille
Res/Refresh	1920x1440/133Hz@32-bit
STORAGE	
Hard Drive	34GB IBM Deskstar UltraDMA/66 (7200rpm, 2MB cache)
CD/DVD	10x Pioneer DVD-114 drive
Removable	250MB Zip drive
Fax/Modem	V.90-compatible U.S. Robotics 5690 PCI modem
SOUND	
Sound	Creative Labs Sound Blaster Live! Platinum with front-access DriveBay
Speakers	Cambridge Soundworks DeskTop Theater DTT2500 5.1 Digital subwoofer/speaker system
OTHERS	
Hollywood+ MPEG decoder | KoolMaxx Video Cooling System NIC card	
THE BUNDLE	
AMA Superbike | *Gamespy* | *Roger Wilco* | *Half-Life: Day Zero*	

BOOT **1:25** DOWN **0:07**



MAXIMUM PC VERDICT

Price $3,399, $4,264 with 19-inch monitor
Company Alienware
Phone 800.494.3382
URL www.alienware.com

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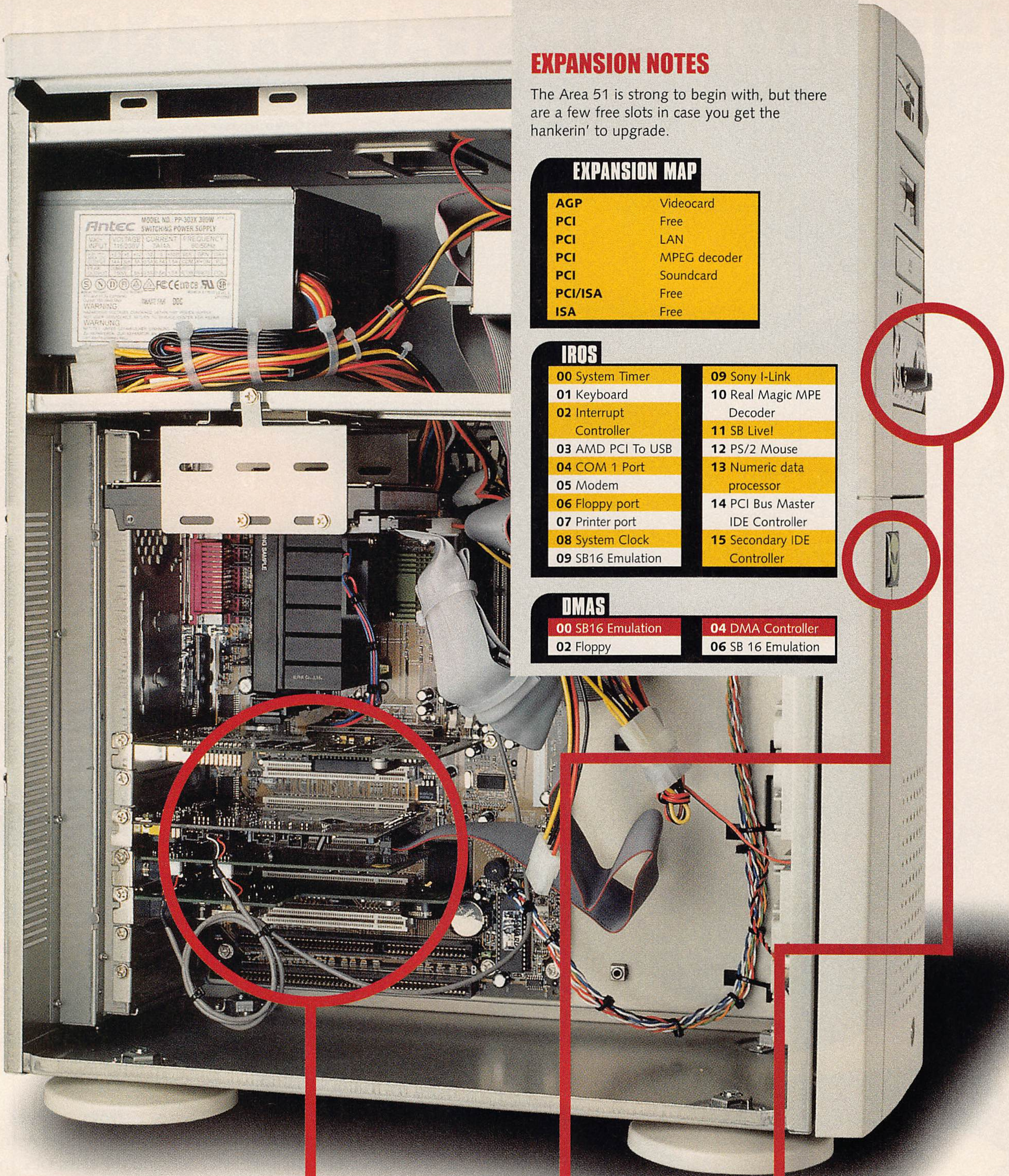


EXPANSION NOTES

The Area 51 is strong to begin with, but there are a few free slots in case you get the hankerin' to upgrade.

EXPANSION MAP

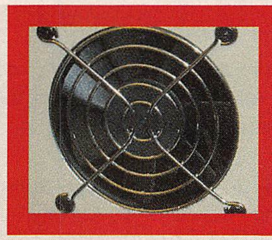
AGP	Videocard
PCI	Free
PCI	LAN
PCI	MPEG decoder
PCI	Soundcard
PCI/ISA	Free
ISA	Free

IRQS

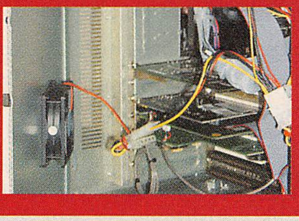
00	System Timer
01	Keyboard
02	Interrupt Controller
03	AMD PCI To USB
04	COM 1 Port
05	Modem
06	Floppy port
07	Printer port
08	System Clock
09	SB16 Emulation
09	Sony I-Link
10	Real Magic MPE Decoder
11	SB Live!
12	PS/2 Mouse
13	Numeric data processor
14	PCI Bus Master IDE Controller
15	Secondary IDE Controller

DMAS

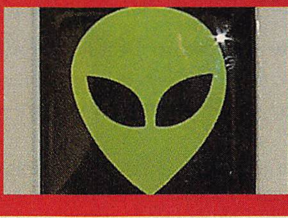
00	SB16 Emulation
02	Floppy
04	DMA Controller
06	SB 16 Emulation



Cool Hand Luke Whatever you do, don't stick your tongue in the external fan. Its purpose is to cool the videocard, not your breath.



I'll Take Door Number One, Monty Oh boy…we just love this case and its easy-open side doors. Makes prodding and probing the intestines so much easier.



Sucking Face, Alien Style The only reminder of the Area 51's lineage is this little guy peeking out of the front of the case.

Drive Faster The Sound Blaster Live! Platinum edition is equipped with a front-mounted drive bay and myriad ports to connect your external MIDI or S/PDIF devices.

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GO TO
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2
3
4
5
6
7
8
9
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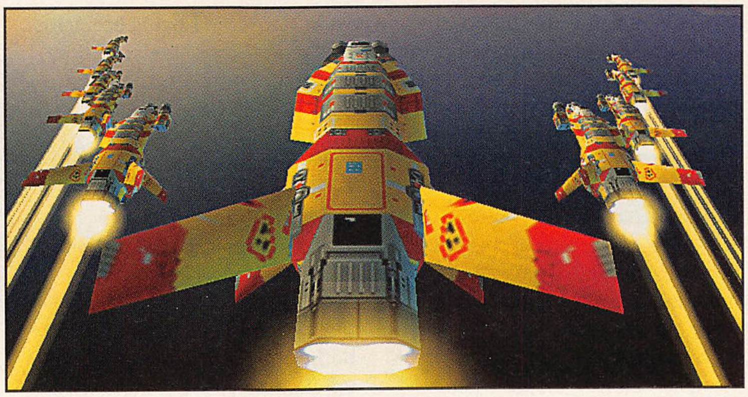
Homeworld

HOME RUN!

MAXIMUM PC KICK ASS! product

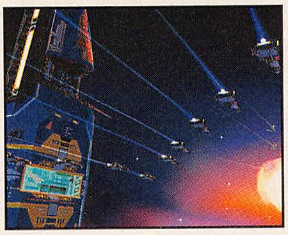
Homeworld is the last great game of this millennium and the first great game of the next. Not only does it shatter all existing norms, it also boldly points to the future of PC gaming.

Homeworld is a realtime strategy game fashioned around an epic quest that's both moving and immersive. The inhabitants of Kharak, an arid and unfriendly world, discover a 3,000-year-old artifact that confirms an ancient legend—Kharak is not their native world. For reasons lost in the shrouds of time, they were transported to Kharak from a planet thousands of light-years away. Obsessed with the need to find their homeworld, each of Kharak's two main clans builds a gigantic mothership and sets forth across the gulfs of deep space to fulfill their racial destiny.



A game with such a riveting story deserves a brilliant 3D engine, and *Homeworld* delivers. In-game action is fluid and incredibly realistic. Camera angles are infinite, allowing you to view events as though you were floating inside a great sphere; the monitor screen all but vanishes.

The fabulous graphics are complimented by stunning sound effects. In a stroke of genuine inspiration, some of the more grandiose scenes are accompanied by a choral version of Barber's *Adagio for Strings* (remember *Platoon*?), lending these moments a surprising emotional power and poignancy.



Offensive and defensive formations make a big difference in combat; use the Sphere formation to protect the mothership and other valuable units.

Full 3D movement and down-to-the-rivets detail make Homeworld a milestone in the RTS genre.

Combat scenes are breathtaking as well. Ships leave streaming vapor trails as they streak through space, missiles corkscrew toward their targets, and wounded vessels stagger out of line, spewing debris and flames.

Like any RTS title, conflict and resource management are important aspects of gameplay, but introducing this aspect in a true 3D environment presents new and daunting challenges. Not surprisingly, the interface is as complicated as the game, though it's semi-transparent and intuitive. It also vanishes from the screen when you hit your spacebar, leaving you with a panoramic, uncluttered view.

An extremely useful narrated tutorial is also provided, reducing what could have been an alpine learning curve to a mere molehill.

To fully enjoy the game's visual splendor, you'll need a 3D accelerator packing at least 12MB. We ran the game on a Voodoo 3000 and a run-of-the-mill Banshee. Aside from a slight framerate degradation with the latter, *Homeworld* performed without a stutter.

Our small peeves? There's no display of damage done to enemy ships, which complicates your tactical decisions, and some assaults on your Mothership veer dangerously toward twitch action reminiscent of *Descent*-style shoot-'em-ups, though they usually stop short of arcade overload.

Minor quibbles aside, *Homeworld* is truly a landmark game. RTS and action game aficionados, this is one you definitely don't want to miss.

—Bill Trotter

THE SPECS

3D CARD SUPPORT	Direct 3D
3D SOUND	A3D EAX
MULTIPLAYER	TCP/IP IPX LAN Free play on Won.net
NO OF PLAYERS	8

PLUSES

- Stunning graphics
- Deep strategic elements
- Exciting cinematic action
- Excellent tutorial

MINUSES

- Battles sometimes become twitch fests
- No data on damage done to enemy ships

MAXIMUM PC VERDICT

Price $50
Company Relic Entertainment
Phone 425.649.9800
URL www.sierrastudios.com/games/homeworld/

9

YOUR SHIPS HAVE COME IN

You can't win a *Homeworld* campaign without getting the most out of the many types of spaceships available. Here are some tips from Alex Garden, the project director:

"A common mistake is to assume your humble scouts are automatically obsolete as soon as higher-tech ships become available. Truth is, if I were forced to play a game without building any scouts, I would be at more of a disadvantage than if I couldn't build any frigates at all. Scouts are fast, cheap, maneuverable, expendable, and quickly made.

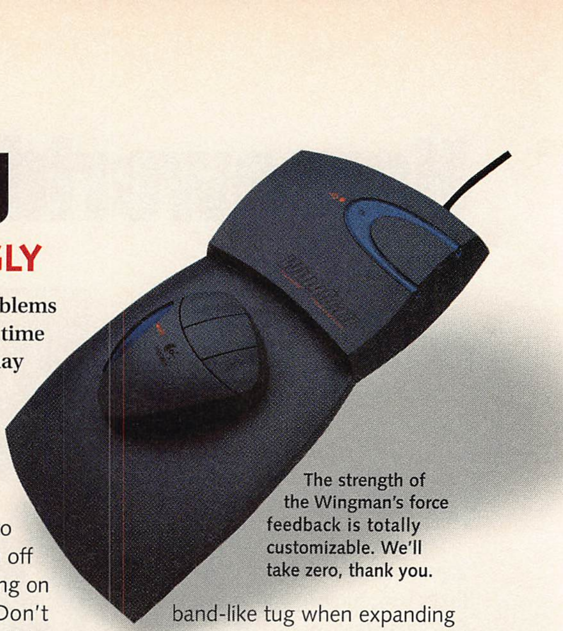
My ideal strike-craft fleet configuration, once all fighter-tech elements have been researched, is 25% Scouts, 25% Defenders, 10% Interceptors, 20% Attack Bombers, and 20% Defense Fighter/Cloaked Fighters.

The biggest factor in winning with strike-craft is micromanagement. Instead of box-targeting the entire enemy fleet, I'd suggest targeting three or four ships at a time. Once two of those are destroyed, target the surviving two and a couple more. Repeat, and destroy as needed."

Hands-On Gaming

THE GOOD, THE WEIRD, AND THE UGLY

Tired of not being able to beat the end boss in *Half-Life*? Having problems laying waste to your friends in a mighty duel of *Rollcage*? Maybe it's time you took control of your own destiny. Here are six controllers that may breathe new life into your favorite game.



The strength of the Wingman's force feedback is totally customizable. We'll take zero, thank you.

Wingman Force-Feedback Mouse

The Logitech Wingman Force-Feedback mouse is quite possibly the most annoying contraption ever to grace our desktop.

For starters, this clone of Logitech's Wingman Gaming mouse is permanently mounted on a plastic plate that houses the force-feedback motor, thus restricting the actual range of movement to a scant few degrees. An included calibration utility ensures that the range of movement matches your desktop limits, but the inability to remove the mouse from the purple plate—no matter how hard you try—is actually rather stressful. Adding insult to injury, the entire shebang consumes far more desk space than a traditional mousepad, and the hardened plastic makes a poor substitute for a comfortable wrist rest.

For gaming purposes, the mouse lands somewhere between slightly useful and completely frustrating, depending on the game's genre. In first-person shooters, the force-feedback characteristics make precision aiming impossible, thereby defeating the entire purpose of playing the game. Firing your gun causes the mouse to kick back, throwing your aim off by a half inch or so, depending on the weapon you're using. Don't bother trying to blow something up, because your crosshairs will be jumping all over the place. Thankfully, the mouse is accompanied by software you can use to modify the amount of force in the feedback. The setting that turns it off completely quickly became our favorite.

The Wingman Force-Feedback's handy "snap to" feature does provide increased selection accuracy during realtime strategy games, which require you to select items onscreen or scroll through massive menus. Moving the mouse over items results in a "click you can feel," so you know definitively that you've moved from one item to the next. This same "snap to" feature is used extensively in the Feelit Desktop software that adds force-feedback to your Windows desktop, enabling you to feel the groove of your scrollbar and a rubber band-like tug when expanding or reducing a window. Granted, this feature makes it easy to differentiate between menu items that are mere millimeters away from one another, but the truth is that we never had trouble performing those simple tasks in the first place.

There's no denying the Wingman Force-Feedback's cool stylings, but most people use mice for precise control. While the force-feedback aspect is interesting, it ultimately interferes with overall performance, turning an otherwise functional gaming mouse into a high-priced, annoying gimmick.

—Josh Norem

MAXIMUM PC VERDICT

Price $100
Company Logitech
Phone 800.231.7717
URL www.wingman .logitech.com

3

Wingman Gaming Mouse

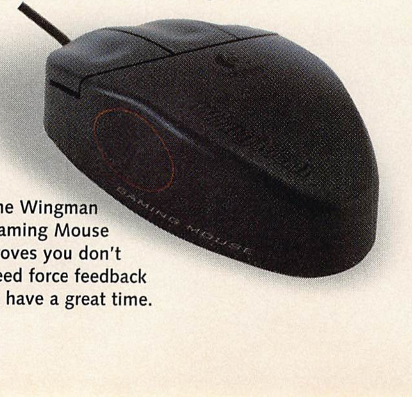
MAXIMUM PC KICK ASS! product

The Wingman Gaming Mouse kicks voluminous amounts of ass. Here's why:

First, it includes software you can use to adjust the mouse's report rate all the way up to 200 times per second. That's five times higher than the average PS/2 mouse report rate, and the result is seriously improved accuracy.

Second, the Wingman Gaming Mouse's small shape—a reverse delta taken from its predecessor, the Mouseman '96—is super easy to hold. It requires you to grasp the device's sides with your thumb and pinky and rest your remaining three fingers on the left, right, and middle click buttons. This fingertip grip results in far greater control of the mouse than you get by using the base of your palm; it's also quite comfortable. Clicking action is top-notch, with a solid, audible "click" each time a button is pressed.

For gaming, this mouse lives up to its name, providing smooth control, dead-on accuracy, and comfort throughout extended frag fests. We didn't mind the missing scroll wheel, although playing games that require heavy scrolling through long menus may be tedious.



The Wingman Gaming Mouse proves you don't need force feedback to have a great time.

The Wingman Gaming Mouse is made for USB, but Logitech provides a PS/2 adapter as well. The software bundle includes MouseWare and a full version of *Shogo: Mobile Armor Division*.

Hands down, this mouse rocks. Get one.

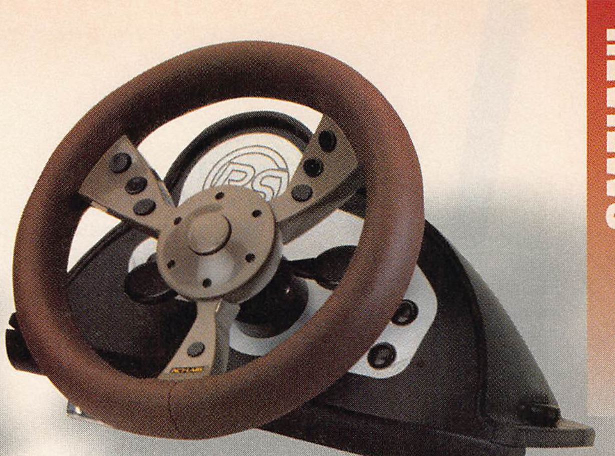
—Josh Norem

MAXIMUM PC VERDICT

Price $40
Company Logitech
Phone 800.231.7717
URL www.logitech.com

9

Force RS Racing System



The Force RS is the wheel deal.

First things first: The Force RS looks strikingly similar to the RS Racing system we reviewed last year. Oh wait: It is the same, but for the addition of force feedback. The wheel column this time around is also more solidly constructed, probably in order to deal with the strain that force feedback puts on the steering shaft. As expected, the wheel's sheer size will easily overpower your desktop. What's unexpected—and irritating—is that the wheel's desktop mounting brackets are poorly implemented and do a lousy job of eliminating the slipping and sliding associated with desktop controllers.

During such games as *DeathKarz*, *Motorhead*, and *Need For Speed: High Stakes*, the Force RS performed admirably. Its steering is sharp, and thanks to its faux leather trim and beefy feel, you'll find yourself taking curves really well. But unless you have thumbs like Sissy Hankshaw, you'll find the wheel's four-way center D-pad totally useless during gameplay. Thankfully, the other buttons are well placed and easy to reach without taking your eyes off the road. The F1-style shifters are flimsy, but reaction times are good. The pedal base is solid and wide so it stays put, and the pedals are positioned at an angle that prevents aches and cramps from extended periods of use.

From a force-feedback perspective, the Force RS simply outperformed Guillemot's Race Leader, also reviewed here. Its superior hardware implementation of force feedback meant that in-game effects such as springs, inertia, and collisions felt much more natural and realistic. So, if feeling the bumps, crashes, and flat tires of racing games cranks your wheel, steer yourself in the direction of the Force RS.

—Kenn Durrence

MAXIMUM PC VERDICT

Price $140
Company Act Labs
Phone 800.980.9997
URL www.act-labs.com

8

SideWinder Dual Strike

A game controller that's suitable for a first-person shoot-'em-up game, and fast enough to replace the precision performance of a trusty keyboard/mouse setup, is about as elusive as the Holy Grail. But Microsoft's new SideWinder Dual Strike is about the closest thing to eternal life that any self-proclaimed disciple of *Quake* will find.

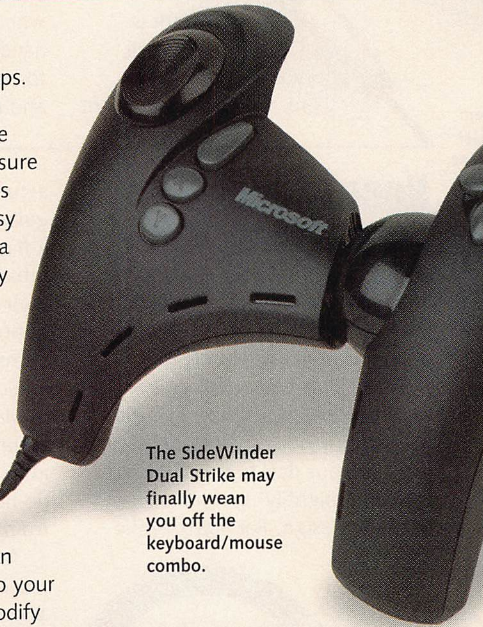
The Dual Strike is aptly named, because you'll need both hands to hold it. The left half—which includes an eight-way hat switch, a trigger, and a shift-toggle button—governs controls traditionally handled by the keyboard, such as moving forward and backward. The right side swivels and rotates to mimic the mouse, allowing you to control the aim and direction of your weapons discharge. There's a trigger on the underside of the handle, and four programmable "fire" buttons that can control myriad in-game functions, such as changing weapons, jumping, or accessing menu options and maps.

Surprisingly, the Dual Strike is among the most comfortable controllers we've had the pleasure of playing with. All the buttons are intelligently placed and easy to access, even in the heat of a spirited frag fest. We especially appreciated that the two trigger buttons are located in perfect alignment with your index fingers.

Like any new device, the Dual Strike has a fairly serious learning curve. Luckily, Microsoft tweaked its customizing software, so you can adjust sensitivity and spin rate to your heart's content. You can also modify any of the bundled game profiles or create new ones that are suited to your personal gaming style. Once you've mastered the Dual Strike's John Woo-patented two-hand approach, you'll be circle strafing and wracking up kills with glee.

Pity your opponent.

—Bryan Del Rizzo



The SideWinder Dual Strike may finally wean you off the keyboard/mouse combo.

MAXIMUM PC VERDICT

Price $50
Company Microsoft
Phone 800.426.9400
URL www.microsoft.com/hardware

9

CONTINUED ON NEXT PAGE

It may not be the sexiest controller around, but the Pool Shark is certainly one of the most ingenious.

Pool Shark

Virtual reality devices for the PC have failed for a variety of reasons: They're too expensive to buy, clunky to use, or simply incompatible with good gameplay. The Pool Shark, consisting of a dual-purpose mouse and collapsible pool cue, shares none of these characteristics. It's among the first devices of its kind that actually works, and with a price under $30 that includes a full copy of *Ultimate 8 Ball*, it'll hardly break your bank.

The beauty of the Pool Shark is its design. The USB mouse can accommodate right- and left-handers and functions as a regular mouse, but it's topped by a small mouse ball on which the pool cue sits. Slide the pool cue across the top ball, press one of the mouse buttons, and voilà...you can hustle your co-workers into buying lunch.

Although the Pool Shark can sense your range of motion and reflects this in the strength with which you hit the cue ball, the lack of actual resistance and a suitable "thud" as you connect with the ball might throw you off your game a bit. Any adjustments to the angle of your shot must also be made within the game itself, using the mouse in the traditional manner. But since the Pool Shark is essentially a mouse with a big stick, it'll literally add a dimension to any pool game designed to be played with a mouse.

You may not become as proficient as Fast Eddie Felson, but as far as PC peripherals go, the Pool Shark is a cool way to refine your table techniques. The only things missing are the beer and sucker bets.

—Bryan Del Rizzo

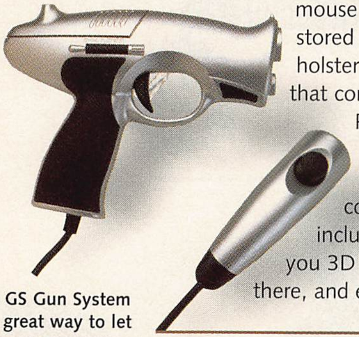
MAXIMUM PC VERDICT

Price $30
Company InterAct Accessories
Phone 410.785.4064
URL www.interact-acc.com

9

GS Gun System

Act-Labs' GS Gun System is a beaut'. Two guns and a hand-held mouse are ingeniously stored in a desktop holster (not shown) that connects to the PC gameport and videocard. A pass-thru connector is included, for all you 3D freaks out there, and each component can be independently calibrated.



The GS Gun System is a great way to let out your aggressions without getting arrested.

Each gun is equipped with a trigger that boasts resounding tactility, and dual fire buttons on the frame. The handheld mouse has an N64-style thumb pad and three separate fire-buttons.

Both guns can be used simultaneously for two-player action, but the real mayhem begins when you use one gun with the handheld mouse. Using the mouse to effectively control movement and aim the weapon while you take shots with the gun makes for unparalleled two-fisted action in games such as *Quake II* and *Half-Life*.

The GS Gun System truly takes first-person shooters to a new level.

—Bryan Del Rizzo

MAXIMUM PC VERDICT

Price $100
Company Act-Labs
Phone 800.980.9997
URL www.act-labs.com

8

Race Leader Force Feedback

Compared to Act-Labs' RS Racing System, Guillemot's Race Leader Force Feedback wheel is in need of an immediate overhaul.

There's no getting around the Race Leader's sheer size; like the RS Racing System, it will consume most of your desktop. In addition, we were mightily unimpressed with its inane design. For starters, the wheel isn't actually round—its small rectangular shape is more reminiscent of a flight yoke. In addition, the apparatus doesn't affix competently to your desktop. Plastic brackets are dutifully included, but they're not permanently attached to the wheel's base, and they have a tendency to slip at the most inopportune times. Suction cups attached to the bottom of the base do nothing to prevent the wheel from sliding around the desktop.

To make matters worse, when you do finally get the wheel properly assembled, you'll discover that its angled, elevated position causes your forearms to cramp up whenever you grip it for more than a few minutes. Crikey! The majority of the Race Leader's buttons, including the two "fire" buttons on the rear of the wheel and the hat-switch on the left, are in great positions, but the overall shape of the wheel makes reaching them too uncomfortable. The pedal base is also smaller than that found on the RS Racing System, and it has a tendency to move around because it's so lightweight.

The Race Leader is one wheel you can live without.

In an ordinary world, the Race Leader's wheel design would already relegate it to the crap heap, but its muted implementation of force feedback makes it the King of Crap Mountain. It was difficult to identify and distinguish different forces during gameplay. Ice, impact, and recoil effects just didn't wow us, and in some cases, we were simply hard pressed to feel anything at all.

In short, the Race Leader gets the red flag.

—Kenn Durrence

MAXIMUM PC VERDICT

Price $130
Company Guillemot
Phone 877.484.5536
URL www.guillemot.com

2

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Freespace 2

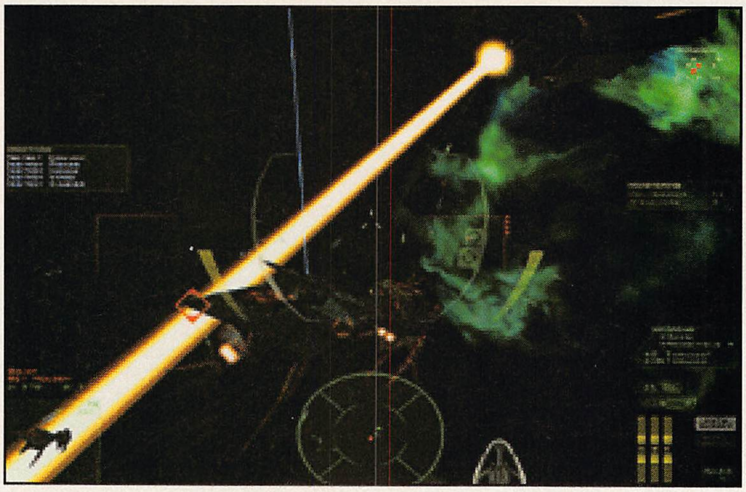
BETTER THAN THE FIRST, AND THAT'S SAYING A LOT

MAXIMUM PC KICK ASS! product

Last year's *Descent: Freespace* was widely criticized for gameplay reminiscent of *Wing Commander* and limited multiplayer support. Thankfully, Volition has addressed these issues and more in *Freespace 2*, and thrown in good-looking graphics to boot.

Freespace 2's plot begins 32 years after the great war that ran its course in the original game. You are a pilot called in to put the smack down on another impending war.

At first look, *Freespace 2*, seems to add few new mechanics to the space combat scenario. À la *Wing Commander*, missions kick off with just a quick briefing before you're sent off to battle your way to glory. But missions are often less straightforward than the briefing would have you believe, and you are occasionally forced to make real-time moral decisions that affect the course of the game.



Whatever you do, don't cross the beams….

We appreciated these plot twists, but *Freespace 2*'s area of excellence is graphics. In short, it's one of the best-looking space-combat games we've ever seen. Ships curve and arc gracefully through mesmerizing nebulae; dynamic lighting casts bright flashes on their hulls as rockets streak by. The Capital ships are awe-inspiring. Armed with titanic beam weapons that often target other Capital ships, these monsters project a sense of fearlessness—and woe be a gnat-sized fighter caught in the path of a Capital ship attack.

Freespace 2's Capital Ships battle it out in the nether regions of space.

The game's engine supports 32-bit textures, and the artists took full advantage of this by tweaking every last bit of color and subtlety from the texture maps. The dynamic lighting is awesome, casting realtime illumination and shadows on all objects as they're passed by light sources. There's nothing like seeing your entire screen light up as a Capital ship's beam weapons stream by, or watching the shattered remains of your target floating away in front of you, glowing and flickering in the light of the nebula.

You can play cooperatively or in standard head-to-head dogfights, but a more interesting addition is the persistent online battle option, called "Squad Wars." These battles, held on Volition's online gaming service called PXO, allow you to work with a team of pilots to fight other human-controlled teams for control of a virtual solar system.

Freespace 2 has moved light-years ahead of its predecessor. Although the stamp of *Wing Commander* is still evident, Volition has resolved the issues that plagued the first version, and created what can easily be called the best space combat game to date.

—André Vrignaud

THE SPECS

3D CARD SUPPORT	Glide I OpenGL I Direct 3D
MULTIPLAYER	IPX I TCP/IP I LAN
3D SOUND	EAX I A3D
CONTROLLER	Joystick I Mouse I Direct Input

PLUSES

- Rich storyline
- Mid-mission plot twists add variety
- Graphically dazzling

MINUSES

- Gameplay formula is rehashed

MAXIMUM PC VERDICT

Price $50
Company Volition
Phone 800.468.3775
URL www.freespace2.com

9

FREESPACE 2

Freespace 2 is, in many ways, a classic air-combat simulator. Though its outer-space setting renders some major differences in scale, some standard flight-combat tactics will hold you in good stead.

▶ **Tip #1:** Don't mess with the Capital ships unless you're forced to. Their massive beam weapons will turn you to toast in a single hit. Obviously, ignore this advice if you're following a specific objective to take out a Capital ship, but even then, carefully scope out your approach beforehand.

▶ **Tip #2:** If you're using a joystick to play (highly recommended), configure at least one of the stick's buttons to trigger missile countermeasures. The game is simply too fast-paced to be accurately played while whacking at the keyboard.

▶ **Tip #3:** Don't despair if you can't get past a certain mission. Volition designed the game to allow you to move on if you fail the same mission five times. All you'll need to deal with is the shame of having soiled your family name.

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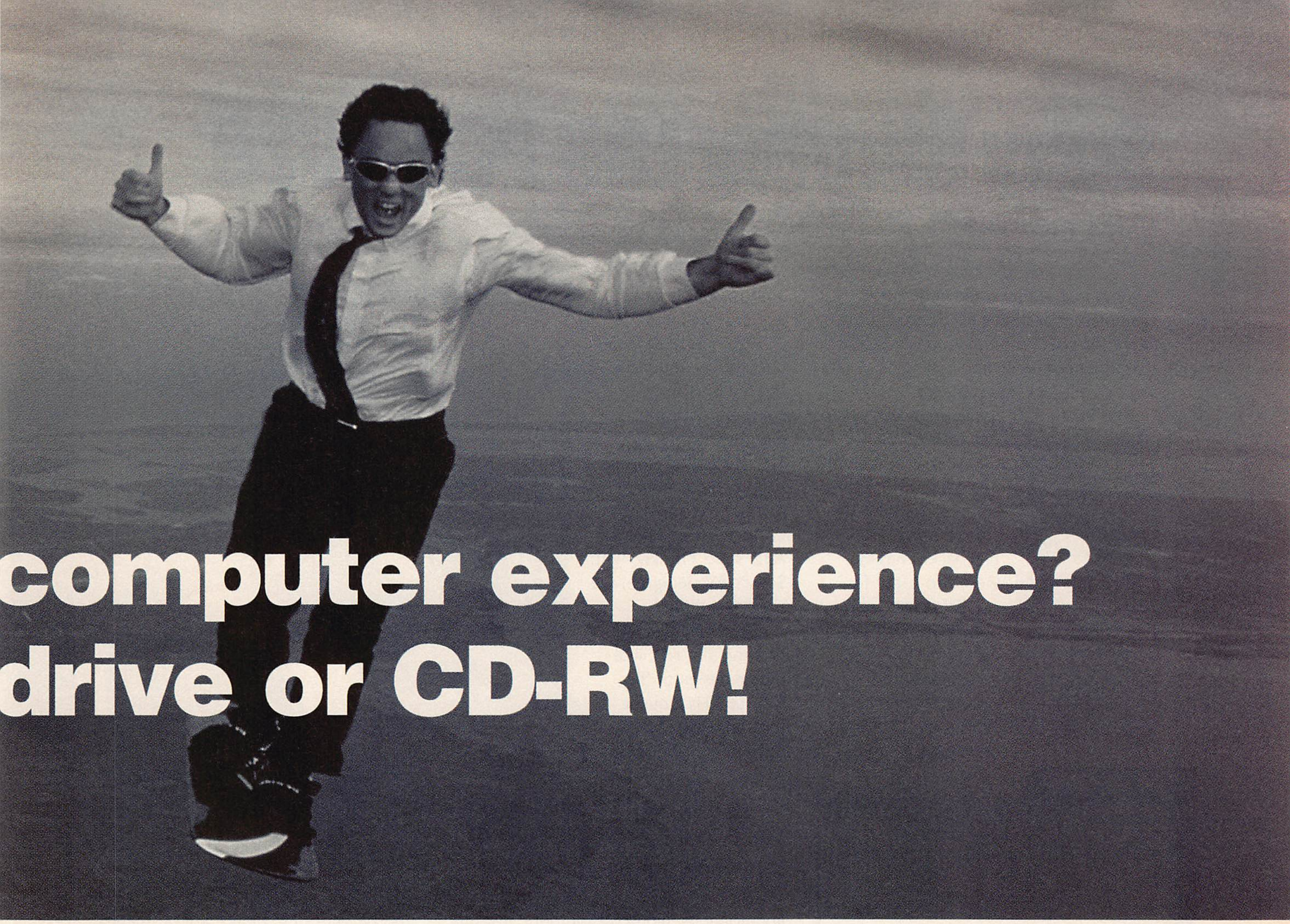
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Sony Slimtop LCD PCV-L620

SLIM PICKINS.

Sorry, Apple—Sony is the undisputed champion of aesthetic PC design. But its new PCV-L620, though it boasts excellent performance and a cool-looking case, falls short of our Kick-Ass standard.

The PCV-L620's performance is on par with other 500MHz P-III systems, but we did run into some issues with the software-assisted DVD playback. Images were too fuzzy for our liking, and were abuzz with artifacts and ghostly images. In addition, the onboard video chip, ATI's Rage LT Pro, is simply better suited to a notebook. It looks dated, plays lousy (12.3fps in *Expendable*? Oh, joy…), and lacks the 3D muscle to compete with the big guys.

The integrated Vortex sound chip is also compatible only with version 1.0 of Aureal's A3D spec. Frankly, with Sony's AV pedigree, we expected more.

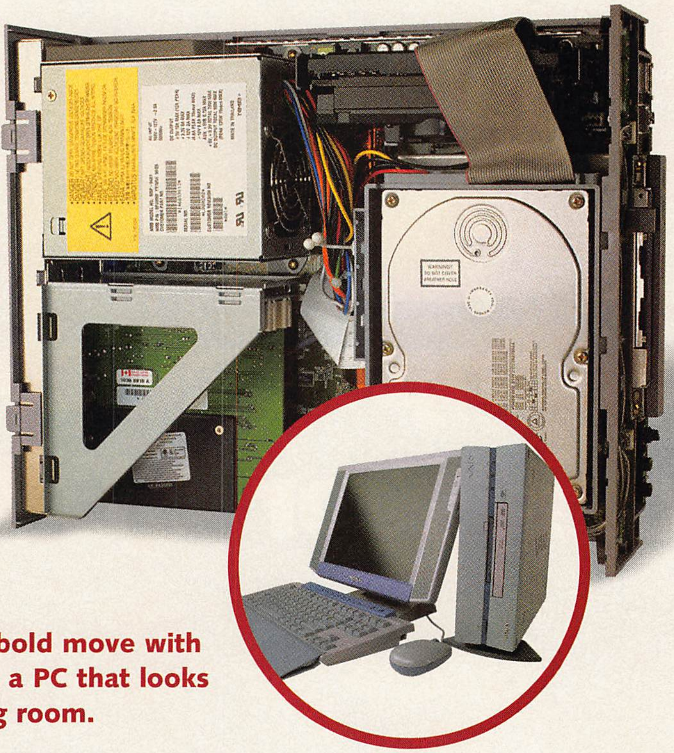
There's no denying that the slim-line, integrated design of the PCV-L620 is a major turn-on. Hell, you'd have to be blind not to appreciate its minuscule footprint, luscious color schemes, and cool aesthetics. We also appreciated the front-mounted i.Link and USB ports, and myriad programmable buttons on the keyboard.

On the removable storage front, we were impressed with the inclusion of a Memory Stick slot, even though it's only really useful if you've got another Sony product that actually uses it.

We also liked the digital, 14.1-inch flat panel LCD. Its images were remarkably crisp and clear, regardless of the angle from which you viewed the screen. The monitor's integrated rotary controls for both brightness and audio volume were also a nice touch. The LCD's e-mail beacon, which lights whenever you have new messages in your in-box, is a definite keeper, and should be standard on *all* monitors.

Unfortunately, it's unclear just what audience Sony is targeting with the PCV-L620. Pure digital video enthusiasts will find the 13GB hard drive too tiny, gamers will wail about the icky 3D performance, and hardcore PC freaks will be scared off by the lack of ability to upgrade. While we can certify that the PCV-L620 is less of a space hog than other systems, if desktop space is your only concern…well, we suggest you go buy yourself a bigger desk.

—Bryan Del Rizzo



Sony has made a bold move with the PCV-L620: It's a PC that looks good in your living room.

PLUSES

- Cool, compact design
- Good performance

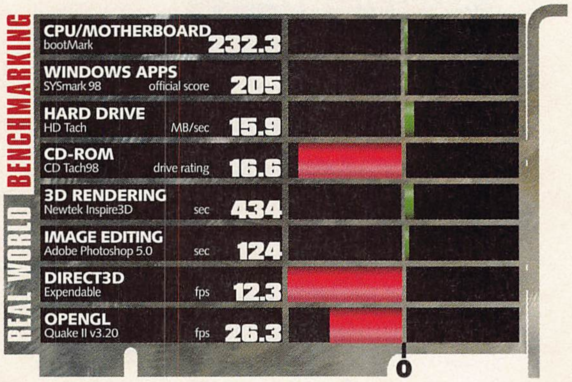
MINUSES

- Not much room for expansion
- 3D chip is barely notebook-worthy
- Middling DVD playback

UNDER THE HOOD

THE BRAINS	
CPU	500MHz Intel Pentium III
L2 Cache	512K pipeline burst L2 cache
RAM	128MB PC-100 SDRAM (expandable to 256MB)
Moboard	Customized, Sony-branded 440BX
Drive bays	None
I/O ports	One parallel, one serial, one monitor, dual USB, line-in, line out, headphone-out, mic-in, dual i-Link (IEEE1394), one flat panel, one keyboard, one PC Card (Type II), one Memory Stick slot
DISPLAY	
Video	ATI Rage Pro LT with 8MB SGRAM
Monitor	Sony brand 14.1-inch adjustable LCD display
Res/Refresh	1024x768/60Hz@32-bit
STORAGE	
Hard Drive	Quantum Fireball 13GB UltraDMA
CD/DVD	Hitachi 6x DVD GD-S1000
Removable	4MB Memory Stick, standard floppy
Fax/Modem	V.90-compatible LT WinModem
SOUND	
Sound	Aureal's Vortex AU8810 PCI sound chip with A3D 1.0 support
Speakers	Harmon Kardon stereo speakers built into the LCD
OTHER	
Ricoh RL5C475 CardBus Controller	
THE BUNDLE	
Sony Digital Media Park I Sony Imagestation on PhotoNet I Sony *PictureGear* I Adobe *PhotoDeluxe* Adobe *Acrobat Reader* I Microsoft *Works 4.5* I Intuit *Quicken Basic 99* I Microsoft *Money 99* I Encarta 99 Encyclopedia I *Outlook 98* I *Dr. Solomon's Anti-Virus* I various online applications	

BOOT **1:02** DOWN **0:05**



MAXIMUM PC VERDICT

Price $2,299
Company Sony
Phone 888.315.7669
URL www.sony.com/pc

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Hard Drive Recovery Software

YOUR DATA MAY BE GONE, BUT IT'S NOT FORGOTTEN

Let's be honest: Most of us don't back up our data regularly, even though we know very well that our hard drives could crash at any moment. So, pretty much every day we don't back up our stuff is another day we put a bullet in the chamber and give it a spin. The good news is that we now have access to a slew of recovery applications that can pull most, if not all of your data off a corrupted drive, even if your file allocation table, master boot record, or partition tables are nuked. And these utilities don't even need to be installed before catastrophe strikes. Put simply, these utilities are your last resort before sending your storage device to a clean room and spending a fortune to have your data recovered by professionals.

Caveat emptor: While the programs reviewed here provide significant mojo for recovering your precious data, they can't recover data that has been both erased and written over. If that happens, nothing short of a time machine can save you.

—Ken Fisher

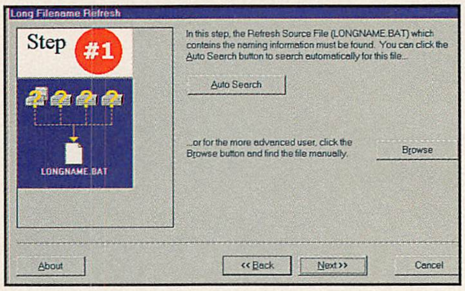
Lost & Found v1.02

Lost & Found has spectacular value: It can recover data from almost any storage device formatted with either FAT16 or FAT32, including (E)IDE and SCSI hard drives, Iomega Jaz and Zip drives, and ye olde floppy.

L&F dealt remarkably well with dumped documents and deleted image files, even after we maliciously destroyed the File Allocation Table. As a read-only recovery utility, *L&F* prevents you from initially storing your recovered data on the drive you're scanning, and it won't fix any file system errors it finds. This is a safety precaution: You shouldn't write data on a disk that might be damaged or contain damaged data. But if you don't have another hard drive to recover to, don't worry; *L&F* includes a spiffy floppy-disk-spanning compression mechanism that eases the pain of plowing through a stack of 3.5-inch disks. Once you've finished the recovery phase and moved the data to another device, you can try restoring it back to the original device if you're comfortable doing so.

The program was amazingly virile, but we did experience a few glitches along the way. *L&F* complained that it couldn't find a bootable disk when we used it on two different systems, which could be why the manual asks you to use a Windows startup disk. And *Lost & Found*'s mildly schizophrenic interface will have you reaching often for the thankfully detailed manual. Sometimes, hitting Enter would continue the recovery process, but at other times the magic key was Esc—which, of course, is what you hit to abort some other operations. In spite of this confusion, *L&F* has the cleanest UI of the three packages reviewed here.

Lost & Found is licensed per machine, so you'll need a separate copy for each machine you care for. No power-user's toolbox should be without *Lost & Found*.



In this step, the Refresh Source File (LONGNAME.BAT) which contains the naming information must be found. You can click the Auto Search button to search automatically for this file...

...or for the more advanced user, click the Browse button and find the file manually.

Lost & Found's Refresh utility, which runs from within Windows, tries to restore long file names. It's almost always successful.

MAXIMUM PC VERDICT

Price $70
Company PowerQuest
Phone 801.437.8900
URL www.powerquest.com

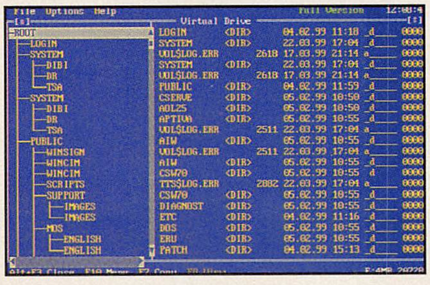
9

Tiramisu v3.04

Tiramisu is advertised as a read-only-data recovery tool similar to *Lost & Found*, but *Tiramisu* allows you to immediately restore data directly back on your source drive, should you elect to do so.

Like *Lost & Found*, *Tiramisu* offers no repair options: The idea is to get your data and get out. *Tiramisu* met every challenge we threw at it, though it was the slowest utility tested, scanning our benchmark machine's 6.4GB hard drive in 67 anxious minutes. The UI is functional, though not as eloquent as the others reviewed here; when browsing the file tree, you must hit the spacebar each time you want to check a specific file's chances for recovery. *Lost & Found* indicates this with color-coding—no button pushing required. However, *Tiramisu* redeems itself with long-filename support that actually works. It also allows you to set a recoverability threshold, indicating what level of file damage is so high that no recovery should even be attempted. This is a real time saver in the event of lost images or databases, which are pretty much worthless once portions of the data are lost.

Unfortunately, *Tiramisu*'s popularity will likely be stifled by Ontrack's somewhat bizarre pricing scheme. It's sold in Lite, Full, or Bundled versions, with the Lite version ringing in at a pleasantly priced $49—but it allows you to recover a total of only five files. And if you're looking for FAT16, FAT32, NTFS, or Zip/Jaz support, you'll have to shell out dough for four different versions of the software, or ante up $195 for the Full version which, though it handles everything else, *still* doesn't provide Jaz or Zip support. Considering that *Lost & Found* provides FAT16, FAT32, Jaz, and Zip support in one box that'll set you back just $70, *Tiramisu* is simply the second choice utility for data recovery.



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ROOT               LOGIN        <DIR>        04.02.99 11:18 _d____ 0000
  LOGIN            SYSTEM       <DIR>        22.03.99 17:04 _d____ 0000
  SYSTEM           VOL$LOG.ERR          2618 17.03.99 21:14 a_____ 0000
    DIBI           SYSTEM       <DIR>        22.03.99 17:04 _d____ 0000
    DR             VOL$LOG.ERR          2618 17.03.99 21:14 a_____ 0000
    TSA            PUBLIC       <DIR>        04.02.99 11:59 _d____ 0000
  SYSTEM           CSERVE       <DIR>        05.02.99 10:50 _d____ 0000
    DIBI           AOL25        <DIR>        05.02.99 10:50 _d____ 0000
    DR             APTIVA       <DIR>        05.02.99 10:55 _d____ 0000
    TSA            VOL$LOG.ERR          2511 22.03.99 17:04 a_____ 0000
  PUBLIC           AIW          <DIR>        05.02.99 10:55 _d____ 0000
    WINSIGN        VOL$LOG.ERR          2511 22.03.99 17:04 a_____ 0000
    WINCIM         AIW          <DIR>        05.02.99 10:55 _d____ 0000
    WINCIM         CSW70        <DIR>        05.02.99 10:55  d     0000
    SCRIPTS        TTS$LOG.ERR          2882 22.03.99 17:04 a_____ 0000
    SUPPORT        CSW70        <DIR>        05.02.99 10:55 _d____ 0000
      IMAGES       DIAGNOST     <DIR>        05.02.99 10:55 _d____ 0000
      IMAGES       ETC          <DIR>        04.02.99 11:16 _d____ 0000
    MDS            DOS          <DIR>        05.02.99 10:55 _d____ 0000
      ENGLISH      ERU          <DIR>        05.02.99 10:55 _d____ 0000
      ENGLISH      PATCH        <DIR>        04.02.99 15:13 _d____ 0000
```

When browsing Tiramisu's file tree, you have to hit the spacebar every time you want to know a file's chances for recovery.

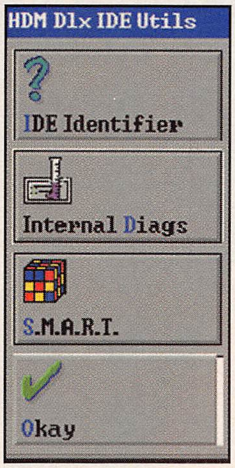
MAXIMUM PC VERDICT

Price $49 for Lite version
Company Ontrack
Phone 800.872.2599
URL www.ontrack.com

7

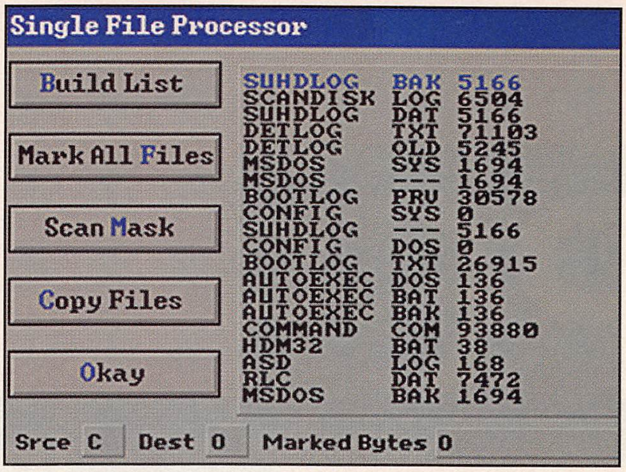
Hard Drive Mechanic Deluxe 4.98

Hard Drive Mechanic Deluxe is an (E)IDE hard drive problem-solver that deals with data recovery as an afterthought: Its primary purpose is repairing file system damage, a task the other utilities reviewed here shy away from. It admirably repairs busted master boot records and fubar'd FAT, though it unwisely attempted to eradicate a benign third-party boot loader from our hard drive. Still, it does provide preventive medicine in the form of S.M.A.R.T. support (Self-Monitoring Analysis and Reporting Technology) that tipped us off to potential mechanical disasters.



The manual suggests you click on certain buttons but no mouse support is included.

In terms of recovering file system structure and functionality, *HDM Deluxe* is a real winner. The utility's Single File Processor recovery tool indicates which files are recoverable by listing groups of filenames in a single, non-hierarchical window. Unfortunately, only 20 filenames can be displayed at a time, and filtering by filename properties, such as *.doc, results in a rescan of your *entire* drive. And since *HDM Deluxe* will write files only to additional hard drive space or a network drive, dropping files onto a floppy or Zip just isn't going to happen.



```
SUHDLOG   BAK 5166
SCANDISK  LOG 6504
SUHDLOG   DAT 5166
DETLOG    TXT 71103
DETLOG    OLD 5245
MSDOS     SYS 1694
MSDOS     --- 1694
BOOTLOG   PRU 30578
CONFIG    SYS 0
SUHDLOG   --- 5166
CONFIG    DOS 0
BOOTLOG   TXT 26915
AUTOEXEC  DOS 136
AUTOEXEC  BAT 136
AUTOEXEC  BAK 136
COMMAND   COM 93880
HDM32     BAT 38
ASD       LOG 168
RLC       DAT 7472
MSDOS     BAK 1694
```

Srce C   Dest 0   Marked Bytes 0

Hard Drive Mechanic's Single File Processor left something to be desired—namely, a respectable interface.

In spite of its ability to do the job well, *HDM Deluxe* simply doesn't live up to its claims of "quick, automatic" file recovery. Users are required to create customized Windows boot disks and to manually invoke a whole series of diagnostic tests that we think should run in the background. *HDM Deluxe* is a great file system *repair* utility, but if you've given up on repairing your drive and just want to recover the few files you accidentally deleted, *Lost & Found* will serve you better.

DARE TO COMPARE

	L&F	TIRAMISU	HDM
Bootable floppy included?	Y	N	N
Recovers files on both FAT16 and FAT32?	Y	Y	Y
Predicts failures?	N	N	Y
Network aware?	Y	Y	Y
Can recover Partition info?	N	N	Y
Can repair broken FAT table and Master Boot Record?	N	N	Y
Can recover to floppy or Zip?	Y	Y	N

MAXIMUM PC VERDICT

Price $50
Company Higher Ground
Phone 770.956.7276
URL www.uglyware.com

7

METHODOLOGY To test each utility, we applied the del *.* kung-fu, zeroed out a few partitions, smudged directory entries, and fdisked the drive. Not even *Norton Disk Doctor* could recognize the disk when we were done with it. Caveat emptor: These programs provide significant mojo for recovering your precious data, but they can't recover data that has been both erased and written over. If a file has been only partially overwritten, you may be able to recover most of your text-based documents. But, if any part of an image file has been corrupted, you probably won't get anything back.

ONTRACK DATA RECOVERY SERVICES

Not all drive crashes can be repaired with recovery software. If a hard drive crash is followed by a scraping or grinding noise, turn your PC off immediately; your drive head has crashed and come into contact with the platter and is thus scratching the hell out of your data. At this point, your only hope for recovery is to enlist the services of trained professionals who will take your drive into a dust-free clean room, strip it apart, and attempt to surgically remove your data with a ton of absurdly expensive equipment. While many companies offer this type of service, none guarantees success—or a refund, for that matter.

For a look at the services offered by these companies, we contacted Ontrack. Our test subject was a broken 1GB drive given to us by the owner of Other Change of Hobbit, a bookstore whose entire customer database was at stake.

Here's how Ontrack worked for us:

1. After we called, Ontrack followed up by fax for more details on the drive in question. They asked us to select a level of service: standard, priority, weekend, emergency, or onsite. We chose standard.
2. We shipped the drive to Ontrack, along with a $100 evaluation fee ($100 was the fee for standard service).
3. Ontrack called us when they received the drive. They called every day thereafter with a progress report on the recovery process. This was followed by e-mail updates indicating which files could be recovered and which could not. The e-mails included price quotes for recovering the usable data.
4. Ontrack sent back the original drive, along with CD-ROMs containing the recovered data.

The entire process took several days and cost $1,200. Lucky for the bookstore owner, 100% of his data was recovered—Ontrack considered him very lucky. You can bet he'll be backing up his files on a daily basis now. To learn more, check out www.ontrack.com.

—Sean Cleveland

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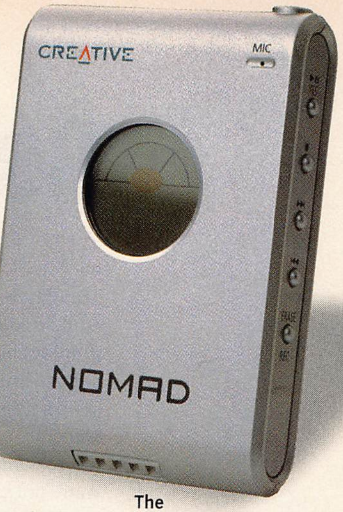
MP3 Players

THE LATEST MP3 PLAYERS ARE GIVIN' IT UP

The first generation of MP3 players left us crying out, "We want more! More memory, more battery life, more functionality. Is that so wrong?" If it is, we don't want to be right, because the latest from Creative Labs and Diamond are givin' up some of this good stuff, and more.

—Ken Durrence



The Nomad is the smallest player we've reviewed.

Nomad

Compact and good-looking in a sleek magnesium case, Creative Labs' Nomad is clearly designed to travel everywhere. Button placement is convenient and intuitive, and since the round LCD that scrolls through song titles and band names isn't backlit—rendering it useless in dim lighting—convenient button placement comes in handy.

Nomad's playback of CD-quality MP3s was crisp and clear. The equalizer settings, though not customizable, include four different modes: Classic, Normal, Rock, and Jazz. You can also set the Nomad to repeat one song or a list of songs, or to shuffle through a playlist—cool, although the shuffle option annoyingly repeats songs before playing through the entire list. Nomad also has a voice recorder that's great for personal notetaking, but the small size of the mike renders the unit pretty much useless for recording lectures. You can, however, listen to the radio during class using Nomad's included FM tuner; radio quality was good even indoors.

The Nomad comes armed with a full 64MB of memory for song and voice storage. Only 32MB of that is onboard—the other 32MB are in the form of a SmartMedia card. The Rio 500 player, also reviewed here, boasts 64MB of onboard memory and an open SmartMedia slot for expansion. Still, the Nomad includes a feature we'd like to see in all future MP3 players: rechargeable batteries.

The only other thing about the Nomad that really bugged us was the interface that governs the transfer of songs onto the unit. Downloading music to the player was frequently hampered because the interface locked up or didn't recognize that the player was in the docking station. This irritation notwithstanding, the Nomad is the real deal. Its solid design and multiple features make it the second best MP3 player we've ever used.

PLUSES
FM Radio
Voice recorder

MINUSES
Not enough onboard memory
Buggy software
Parallel port

THE SPECS
INTERFACE
25-pin parallel port adapter
FEATURES
LCD Display Screen
DIMENSIONS
2.28"x3.3"x .66"
64 grams

MAXIMUM PC VERDICT

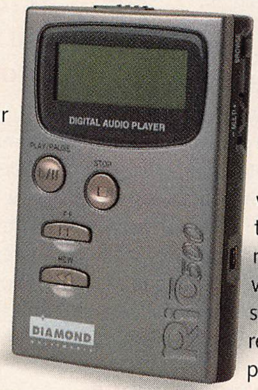
Price $249
Company Creative Labs
Phone 800.998.5227
URL www.creative.com

8

Rio 500

The Nomad gets the award for second-banana because the Rio 500 is our numero uno. The LCD is easy to read and is backlit, so it's easier to use in the dark. Best of all, the Rio 500 comes armed with a fat 64MB of onboard RAM and a free expansion slot that supports SmartMedia, for a total of 96MB. That translates to over an hour and a half of CD-quality music.

The Rio's playback functions offer everything you need. MP3s are stored in "folders," and using the Repeat and Random functions, you can choose to play one track, one folder, or all the folders, in any order. With the convenient thumb-nub wheel, it's easy to choose all your settings with one hand.



Rio also comes in iMac-ish blue and purple.

The player's most impressive feature, and one that's currently unique to the Rio 500, is the use of a USB connector to download songs. We downloaded a 5MB song in just 10 seconds—1/15 the time it took to download the same song to the Nomad. Though both players have a 1-to-20 volume-control scale, the Rio's loudest was louder than the Nomad's; it won't make your ears bleed, but it's more than sufficient for blocking out ambient sound. Overall playback quality was similar to that delivered by the Nomad, but Rio's four-preset EQ allows customizable settings, so you can manipulate bass and treble to your own specifications.

Rio's included software is more confusing than Nomad's, but it never crashed when we were downloading songs and it always recognized when the player was plugged into our PC.

Diamond could have received a Kick-Ass award if the Rio 500 had an FM tuner and rechargeable batteries like the Nomad's, but the overall package still beats out the Nomad.

PLUSES
USB!
Backlit screen
Open slot for expansion

MINUSES
No radio
Tiny ear nub headphones
No rechargeable battery

THE SPECS
INTERFACE
USB
FEATURES
LCD Display Screen
Backlit track
Number, name, time, battery indicator
DIMENSIONS
3.6"x2.5"x.75"
78 grams

MAXIMUM PC VERDICT

Price $270
Company Diamond
Phone 408.325.7000
URL www.diamondmm.com

9

GeForce shakes it up

AIN'T NOTHIN' BUT A G' THANG

Though the "G" in GeForce stands for geometry, it could easily stand for gamble, since nVidia's new graphics processor is loaded with features that will go unused by most games until well into next year. It's the first graphics processor to accelerate transform and lighting calculations (see Inside Sources, page 22), meaning it's capable of pushing more polygons than any other 3D chip currently available. Besides hardware T&L, GeForce also supports more esoteric features, such as dot product bump-mapping, texture compression, and cube environment mapping.

Of course, the "G" could also stand for gigantic, since nVidia's 0.22 micron graphics processor is packed with 23 million transistors. Compared to the 9.5 million transistors that make up a 450MHz Pentium III, the GeForce 256 is one complex mutha. Because of the chip's intricacy, the GeForce's suggested clock rate is limited to 120MHz. Although several board makers plan to include overclocking utilities with their GeForce cards, you probably won't be able to take the clock too far above this limit.

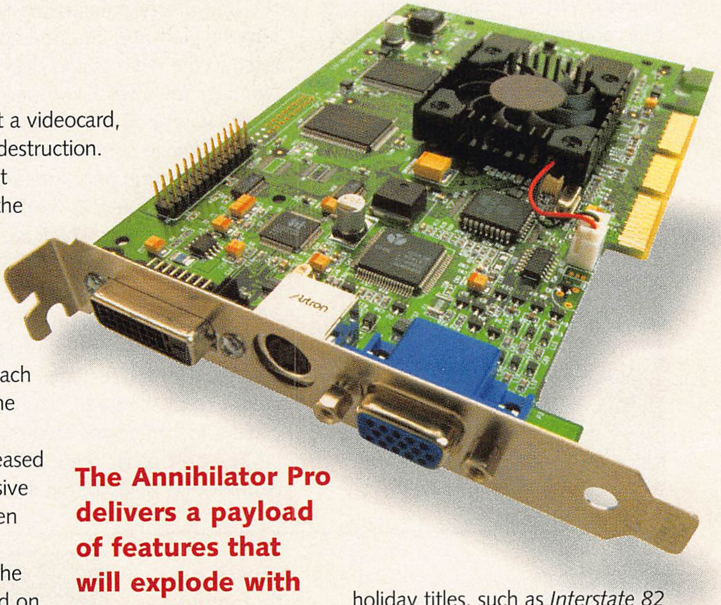
—Sean Downey

Creative Labs Annihilator Pro

The Annihilator Pro isn't a videocard, it's a weapon of mass destruction. Creative Labs is the first board maker to mate the GeForce with double data rate (DDR) memory, which is like capping off an ICBM with multiple warheads. DDR memory can transfer data twice each clock cycle, effectively doubling the bandwidth between the graphics processor and local memory. Increased memory bandwidth means explosive performance, especially in next-gen engines such as *Quake III*.

Compared with the scores of the standard GeForce boards reviewed on the next page, benchmark scores of the Annihilator Pro may not seem all that special. That's because our current benchmarks are based on current games, which don't require enough memory bandwidth for the Annihilator Pro to really strut its stuff. The increased bandwidth available through DDR memory really becomes effective in 32-bit color rendering at high resolutions. This means that the Annihilator Pro isn't the best investment for current games, but it will show holiday titles, such as *Interstate 82* and *Black & White*, in the best possible light. Of course, even with the release-candidate drivers we used for our tests, the Annihilator Pro still managed to outperform every other videocard that has previously passed through our lab, and it absolutely dominated the competition in the *Q3test* timedemo (see sidebar).

Other highlights include DVI and TV-out support, both of which work as advertised. DVI sends a pure digital signal out to the new breed of flatpanel monitors, resulting in incredibly sharp displays, and TV-out encodes S-video signals for low-resolution output to television. Combine the TV-out with the bundled *WinDVD* software and you have a decent DVD player that doesn't display the kind of ugly scaling and dithering that plagued nVidia's TNT2.



The Annihilator Pro delivers a payload of features that will explode with future titles.

MAXIMUM PC KICK ASS! product

PLUSES

- Good image quality
- Versatile drivers
- Downloadable unified drivers
- Downloadable overclocking utility
- Superior high-end game performance
- Strong video playback

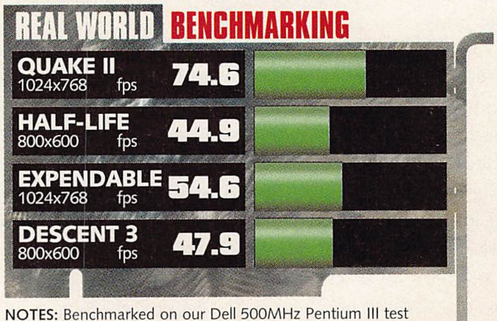
MINUSES

- Expensive
- Success depends a lot on future game support

THE SPECS

CLOCK SPEED	120MHz bus 301MHz memory
RAMDAC	350MHz
AGP SUPPORT	AGP 2x/4x with fast writes
LOCAL MEMORY	32MB DDR SDRAM
MAX 32-BIT RESOLUTION	2048x1536
MAX 16-BIT RESOLUTION	2048x1536
MAX 1600X1200 REFRESH RATE	85MHz
BUNDLE	Win9x, NT drivers | Intervideo WinDVD player | E-Color *Colorific* and *3Deep* | *Evolva:Scout* | *Need for Speed 4*

REAL WORLD BENCHMARKING



NOTES: Benchmarked on our Dell 500MHz Pentium III test system using version 3.47 of the Creative drivers. K7 benchmarks are posted online. As always, V-Sync is enabled.

MAXIMUM PC VERDICT

Price $ 300
Company Creative Labs
Phone 800.998.5227
URL www.creative.com

9

For definitions of Terminator words, hyperlink to the back of Maximum PC, or check out the Terminator online at www.maximumpcmag.com.

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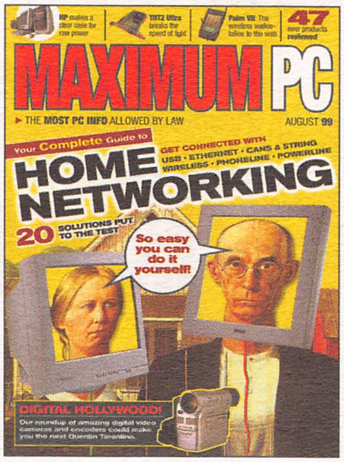
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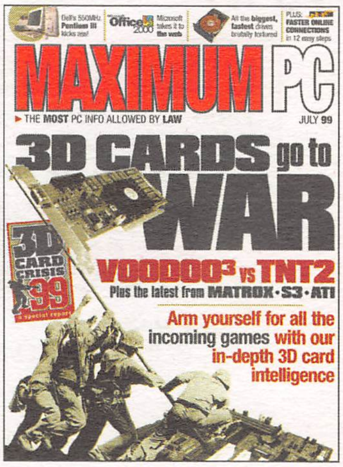
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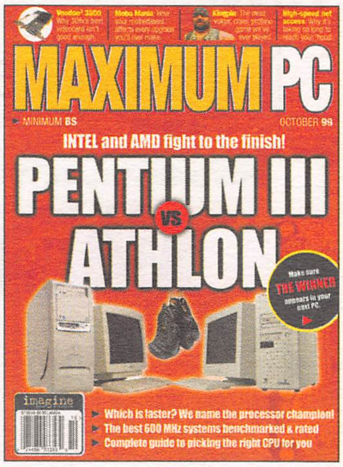
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MAXIMUM PC

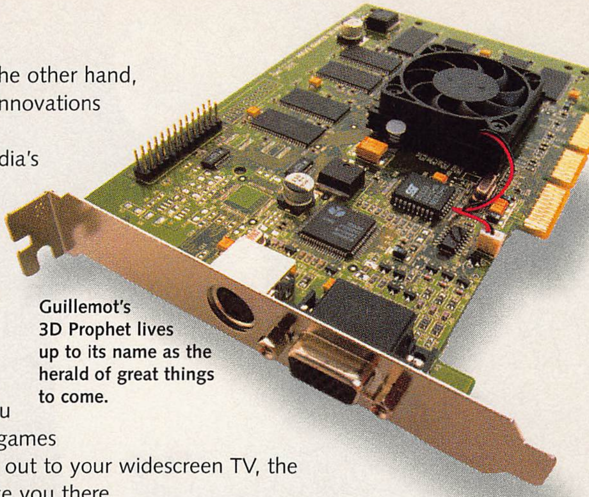
The ultimate upgrade for savvy PC owners.

Guillemot 3D Prophet and Creative Labs Annihilator

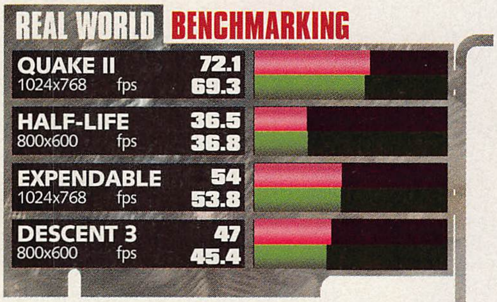
The first two GeForce boards to hit store shelves are darn similar to one another. Both the 3D Prophet and the Annihilator come equipped with 32MB of 166MHz SDRAM, and both offer overclocking tools (Creative's is available from its web site), which can take the memory clock up to 185MHz. Both use a 350MHz RAMDAC to power resolutions up to 2048x1536, and both kick out excellent image quality in games and in video playback. Best of all, both the 3D Prophet and the Annihilator managed to hit benchmark records (just behind the Annihilator Pro) in every benchmark but our *Half-Life* timedemo, which still belongs to 3dfx's Voodoo^3 3500 TV.

The differences lie in the cards' drivers and their TV-out support. On the driver front, Creative gains the upper hand with newer drivers in the box and timely driver updates and innovations, such as the Unified drivers that let the Annihilator (and the Annihilator Pro) run Glide games. Creative has also made a game launcher available for download, which lets you tweak the card's settings differently for each game you play. Guillemot, on the other hand, offers no new innovations beyond what's available in nVidia's reference drivers, but does offer TV-out in their 3D Prophet—a feature not available on the Annihilator board. So, if you want to pump games or DVD movies out to your widescreen TV, the Prophet will take you there.

Like the Annihilator Pro, the Prophet and the Annihilator yield mild performance increases over TNT2 Ultra cards in today's games, and really shine when running next-generation games, particularly those that utilize hardware transform and lighting. If you're looking for an upgrade from your old 3dfx Voodoo^2 or nVidia TNT card, the Prophet and the Annihilator will provide a significant boost to tide you over well into next year. If you just bought a new TNT2 Ultra or a Matrox G400 card and don't want to invest that much in an uncertain future, you won't be sorry if you sit tight and wait to see what the future holds.



Guillemot's 3D Prophet lives up to its name as the herald of great things to come.



NOTES: Benchmarked on our Dell 500MHz Pentium III test system using version 3.35 of the Guillemot drivers and 3.48 of the Creative Labs drivers. K7 benchmarks are posted online. As always, V-Sync is enabled. 🟥=Annihilator 🟩=3D Prophet

MAXIMUM PC VERDICT

Price $250
Company Creative Labs
Phone 800.998.5227
URL www.creative.com

Price $290
Company Guillemot
Phone 877.484.5536
URL www.guillemot.com

8

PLUSES

- Good image quality
- Strong video playback

MINUSES

- Success depends a lot on future game support

THE SPECS

CLOCK SPEED	120MHz bus 166MHz memory
RAMDAC	350MHz
AGP SUPPORT	AGP 2x/4x with fast writes
LOCAL MEMORY	32MB SDRAM
MAX 32-BIT RESOLUTION	2048x1536
MAX 16-BIT RESOLUTION	2048x1536
MAX 1600X1200 REFRESH RATE	85MHz
ANNIHILATOR BUNDLE	Win9x, NT drivers I Intervideo WinDVD I E-Color *Colorific* and *3Deep* I *Evolva:Scout* I *Need for Speed 4*
PROPHET BUNDLE	Win9x, NT drivers I XingDVD player I demo samples disc

QUAKING WITH GEFORCES

Since no currently available games push the GeForce's new hardware T&L abilities, we used id's *Quake III: Arena* test (version 1.08) to see how well the new GeForce boards handled the game's 32-bit colors and curved surfaces. Even Carmack's finest doesn't utilize the full capabilities of these new cards. *Quake III* only taps into GeForce's transform engine and does a little texture compression, but doesn't make use of the lighting engine at all. To throw even more complex geometry at the cards, we increased the number of triangles used in the game's architecture with this series of commands:

```
r_lodbias -2
r_lodCurveError 10000
r_subdivisions 1
```

The benchmark results show the advantages of hardware T&L, as well as the performance gained through the Annihilator Pro's DDR memory. When compared to Guillemot's highly clocked TNT2 Xentor 32 Ultra board, you can see how well GeForce handles more complex geometry, especially at higher resolutions. Right now, GeForce is the *Quake III* card.

DARE TO COMPARE

QUAKE3 TEST VERSION 1.08

	GUILLEMOT 3D PROPHET	CREATIVE LABS ANNIHILATOR	CREATIVE LABS ANNIHILATOR PRO	GUILLEMOT XENTOR32
1024x768 Highest at 32-bit color	35.2fps	34.3fps	47.9fps	30.8fps
800x600 High at 32-bit color	57.9fps	58.3fps	65.4fps	47.6fps
640x480 Fast at 16-bit color	65.6fps	68.5fps	69.1fps	54.5fps

NOTE: Benchmarked on our Dell 500MHz Pentium III test system.

You can't see your opponent. Sometimes that's a good thing.

Everybody needs games. Even this guy. We're talkin' cards. Board games. Hey, even chat with opponents while you play. Actually, that might be a bad idea.

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Drakan: Order of the Flame

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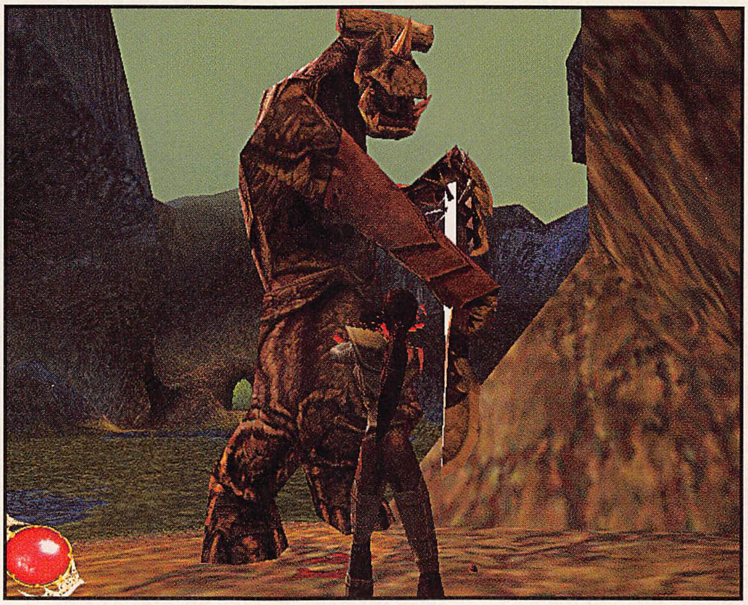


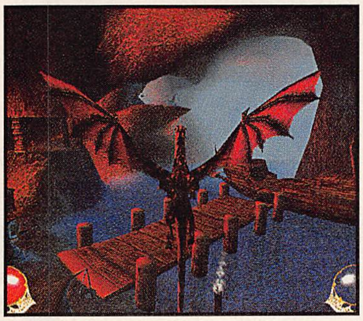
Drakan's burly baddies bring Rynn nothing but bad news.

At first glance, *Drakan* appears to be a *Tomb Raider* clone: same busty heroine, same watch-her-wiggle, third-person camera angle. But while Lara Croft and Rynn, *Drakan*'s lead heroine, have comparable, uh, assets, the similarities between the games virtually end there. *Drakan* is unlike any other game in its genre, combining loads of intense hand-to-hand combat with flight-sim-like aerial maneuvers—aboard a dragon, no less—all set within a majestic world that's as lush-looking as it is deadly.

The game begins with your little brother's kidnapping at the hands of some bloodthirsty trolls. You set off to rescue him, but the plot quickly escalates; before you know it, you're out to save not only your little bro, but also the entire world.

Though *Drakan*'s basic plot is typical RPG fare, what sets the game apart from your usual third-person adventure is the care that clearly went into Surreal's Riot engine. More than three years in the making, it renders everything in the world of *Drakan* with exquisite detail, and gracefully handles transitions from enormous outdoor areas to cramped indoor caves. Using 32-bit color, multitexturing, and environment-mapped bump-mapped textures, *Drakan*'s varied environments come alive with crisp, snow-capped mountains, shimmering water, and fiery lava pits. Game resolution and fog depth are also user-scalable on the fly, via simple keyboard strokes.

Framerates can make or break a game, and we encountered nary a hiccup in *Drakan*. Even with all the eye-goodies enabled, the game easily pulled over 25fps at 1024x768 in 32-bit color on our Millennium G400. However, *Drakan* supports only hardware D3D, so folks still living in a non-3D-accelerated world are SOL.



Aerial combat in an RPG? Take that, Lara Croft!

Of course, sweet graphics will carry a game only so far—gameplay is still king. *Drakan*'s play is best described as diverse, combining elements of action-adventure games with key-finding RPG tasks. The action is virtually non-stop as you engage in air combat aboard your dragon and melee-style brawls on the ground, using a collection of sharp objects and maces. The *Descent*-style controls used for flying the dragon can take some getting used to, but overall they're very intuitive. Our only complaint was that moving the mouse often resulted in the camera rotating around the main character, rather than aiming our weapon—a pretty annoying glitch. Clipping problems were also apparent; in some scenes, we jumped into the water and fell right out of the level. Not good.

Multiplayer support is included for three types of gameplay: melee combat, dragon wars, and "Master of the Dragon," in which one player mounts a dragon and takes on all the other players, who must band together to topple the person riding the dragon. Unfortunately, multiplayer is buggy out of the box, and we had a difficult time connecting to servers through Gamespy. Mplayer support is also included, but we've had nightmares about that service ever since the *Daikatana* demo was released.

Flaws aside, *Drakan* is extremely engrossing. Not only does it kick *Tomb Raider*'s ass all over the map, it also offers a surprising amount of depth for a seemingly rehashed formula. If this is where the future of the RPG genre is headed, you can count us in for sure.

—*Matthew Jolley*

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Direct Sound
A3D
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INPUT SUPPORT
Force feedback
MULTIPLAYER
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IPX
TCP/IP
NO. OF PLAYERS
8

PLUSES

- Gorgeous graphics
- Great levels
- Environment-mapped bump-mapping, baby!

MINUSES

- Occasionally disorienting control style
- Some setup problems

MAXIMUM PC VERDICT

Price $50
Company Psygnosis
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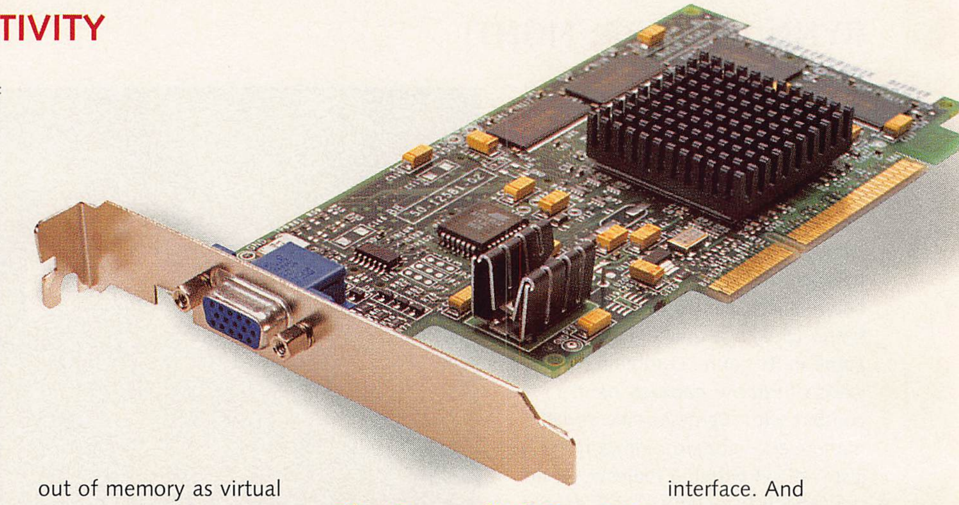
URL www.drakan-game.com

8

3Dlabs Permedia3 Create!

BENCHMARKING CREATIVITY



The Permedia3 Create! falls way short of the fill-rate performance expected from today's 3D gaming hardware, but makes up for it (somewhat) with innovative features that accelerate graphics apps. Based around the latest 3Dlabs' graphics processor, the Create manages to keep up with the joneses when it comes to such advanced features as dot product bump-mapping, 32-bit color support, and single-pass multi-texturing. It even manages a few tricks not seen in other cards via a multitexturing engine that can perform three separate operations on two textures each clock cycle, and virtual texturing hardware support.

Virtual texturing allows the Create to load just the parts of a texture that are visible in each frame, rather than loading the entire texture. This means less memory reads for each screen update and more efficient use of large high-quality textures, without having to bog down the AGP bus with excess traffic. It also helps applications such as *Photoshop* by reading portions of extremely large graphics in and out of memory as virtual textures, which keeps the app from constantly shuffling data to and from the hard drive.

Since 3Dlabs bills its new card as a content creator's best friend, we decided to see if we could measure the Create's creative edge with some real-world benchmarks. Starting with *SYSMark 98*, we constructed a custom graphics apps script, which ran through *Bryce 2*, *CorelDraw 8.0*, *Elastic Reality 3.1*, *Extreme 3D 2*, and *Premiere 4.2* and reported a *SYSMark* score for each. We added up all of the scores and reported the total *SYSMark* benchmark result for graphics apps. Then we tested image-editing performance with our *Photoshop* benchmark, and complex OpenGL model manipulation with two *Viewperf* benchmarks from the OpenGL Performance Characterization organization.

As you can see from the chart below, the Create card took top honors only in *Photoshop*, which benefits a little from virtual texturing. The G400 MAX took home the prize in the *SYSMark* marathon as a result of its 360MHz RAMDAC and 256-bit memory interface. And even though the Annihilator dominated the field in OpenGL performance with its dedicated geometry transform engine, the Create came in first out of all the non-hardware T&L boards, thanks to 3Dlabs' more mature OpenGL ICD.

From our test results, it's obvious that 3Dlabs' claims of accelerating graphics apps are based in some fact. But, considering the Create's abysmal performance in our gaming benchmarks, you have to wonder if it's worth the slight increase in graphic-app performance to have a card that puts out the worst gaming framerates of any board we've tested this year.

— Sean Downey

The Permedia3 Create! doesn't play games well, but it adds a little pep to graphics apps.

THE SPECS

CLOCK SPEED	73MHz bus 110MHz memory
RAMDAC	300MHz
AGP SUPPORT	AGP 2x
LOCAL MEMORY	32MB SDRAM
MAX 32-BIT RES	1600x1200
MAX 16-BIT RES	1600x1200
MAX 1600X1200 REFRESH RATE	85MHz
BUNDLE	Win9x, NT drivers I Cyberlink PowerDVD player I E-Color *Colorific* and *3Deep*

PLUSES

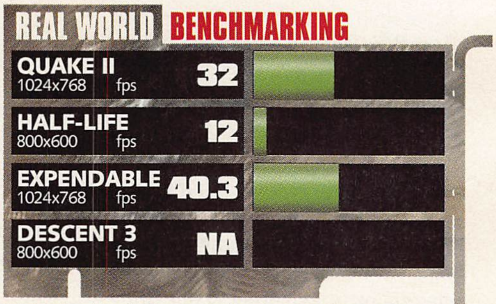
Innovative virtual texturing feature

Decent DVD playback

MINUSES

Slow as molasses

REAL WORLD BENCHMARKING



NOTES: Benchmarked on our Dell 500MHz Pentium III test system using version 2106-0684 of the 3Dlab Permedia drivers. K7 benchmarks are posted online. As always, V-Sync is enabled

DARE TO COMPARE

	CREATIVE LABS ANNIHILATOR	3D LABS PERMEDIA3 CREATE	MATROX MILLENNIUM G400 MAX	GUILLEMOT MAXI GAMER XENTOR32
SYSMark 98 Graphics Apps	1038	1038	**1059**	1039
Photoshop (min:sec)	2:43	**2:42**	2:45	2:45
Viewperf Awadvs- 03 (fps)	**63.8fps**	17.6fps	8.6fps	11.4fps
Viewperf DRV-06 (fps)	**17.5fps**	6.2fps	4.8fps	7.4fps

NOTE: Benchmarked on our Dell 500MHz Pentium III test system.

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URL www.3dlabs.com

6

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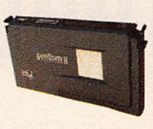

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Pentium P-5 MMX 233 $Go Web
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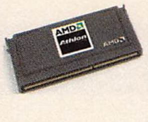
Pentium III 450 MHz. $206
Pentium III 500 MHz. $256
Pentium III 550 MHz. $403
Pentium III 600 MHz. $614



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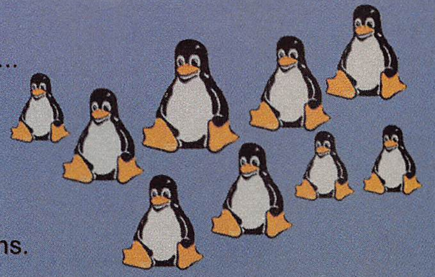

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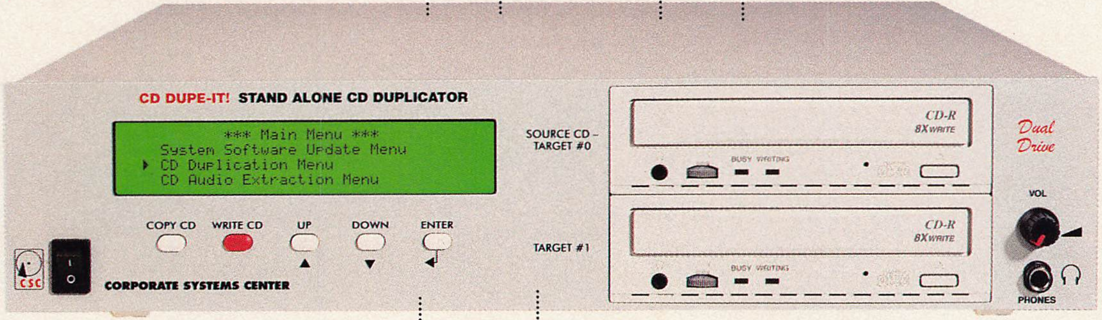
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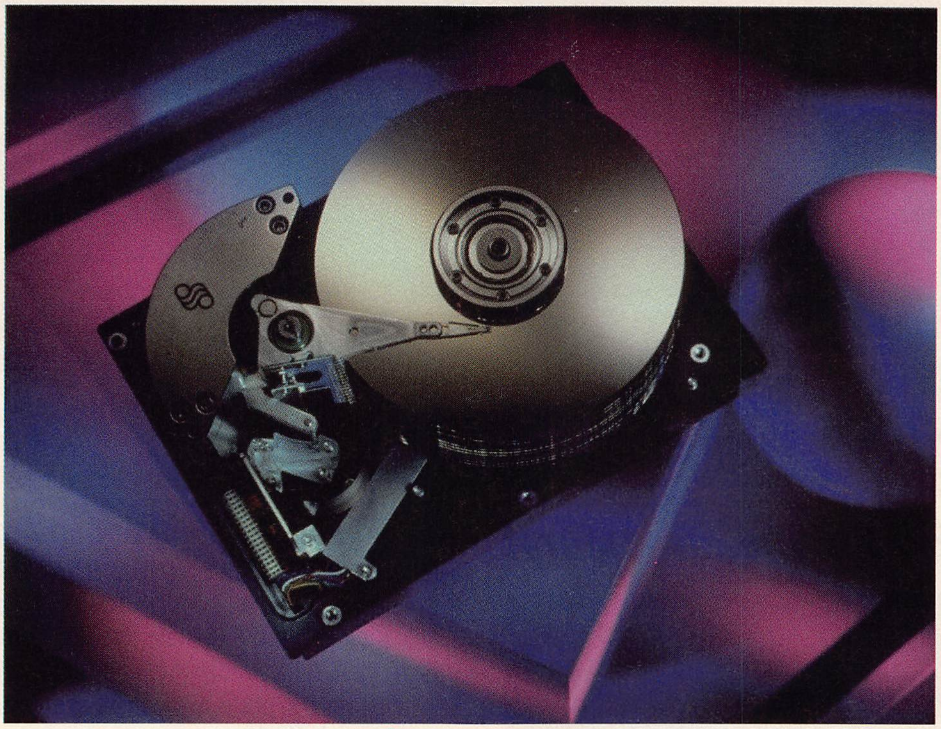

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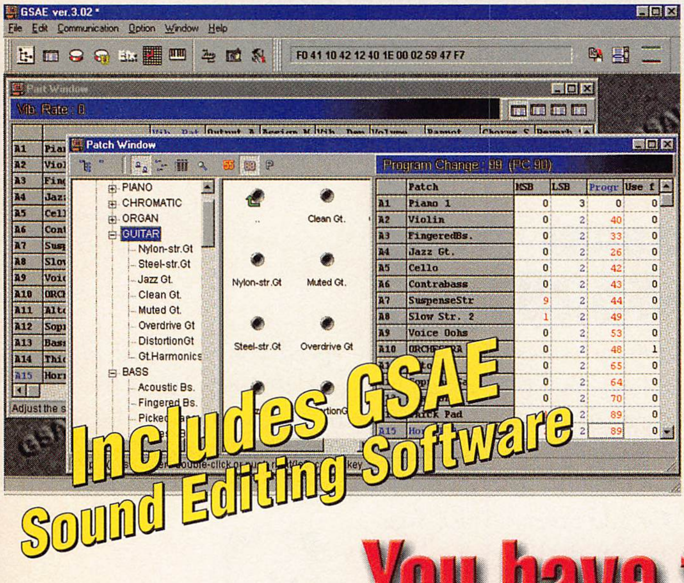
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Jazz Gt.
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Acoustic Bs.
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Clean Gt.
Nylon-str.Gt
Muted Gt.
Steel-str.Gt
Overdrive Gt
Adjust the s

F0 41 10 42 12 40 1E 00 02 59 47 F7

Program Change : 89 (PC 90)

	Patch	MSB	LSB	Progr	Use f
A1	Piano 1	0	3	0	0
A2	Violin	0	2	40	0
A3	FingeredBs.	0	2	33	0
A4	Jazz Gt.	0	2	26	0
A5	Cello	0	2	42	0
A6	Contrabass	0	2	43	0
A7	SuspenseStr	9	2	44	0
A8	Slow Str. 2	1	2	49	0
A9	Voice Oohs	0	2	53	0
A10	ORCHESTRA	0	2	48	1
[illegible]	[illegible]	0	2	65	0
[illegible]	[illegible]	0	2	64	0
[illegible]	[illegible]	0	2	70	0
[illegible]	[illegible]ick Pad	[illegible]	2	89	0
A15	Hor[illegible]	[illegible]	2	89	0

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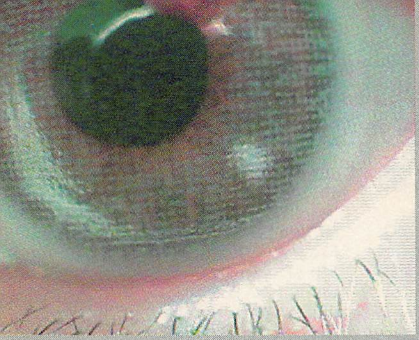

TERMINATOR

Tech Terms Revealed ▶

Technical terms found throughout MAXIMUM PC are underlined and in blue. Hyperlink back to here for revelation and further explanation. Terms appearing in **blue** within the Terminator are updated definitions of previously explained concepts.

A

artifacting Graphical flaws caused by the shortcomings of a compression technology. Often manifested as blotchiness in what should be a solid color.

AGP 4x Accelerated Graphics Port is an expansion bus developed by Intel specifically for the videocard subsystem. It operates independent of the PCI bus and normally runs at 66MHz (i.e., 1x). Whenever you see multipliers attached to AGP, such as 2x or 4x, they are referring to how much faster the bus will run.

Aperture grille A monitor technology that allows for a brighter display than competing shadow-mask technology. By delineating pixels with unbroken vertical stripes as opposed to round mask holes, aperture grille displays allow more electrons to shine through than shadow mask displays, and thus are brighter.

ATA/66 An enhanced version of the IDE I/O interface; supports 66MB/sec throughput bursts.

C

CCD Charged Couple Device. It is a tiny silicon wafer that's built into many of today's digital cameras and video camcorders. It's a sensor used to convert light into a video signal, made up of thousands of tiny, light-sensitive pixels that react to incoming light. Its tiny semiconductors are connected so that the output of one serves as the input of the next. From there, the light is converted into an electrical signal that can be recorded onto a videotape.

CMP Chip multiprocessing. The integration of two or more processor cores on a single chip. It allows multiprocessing in a single-processor system. Not to be confused with SMP (symmetric multiprocessing), which requires two or more separate processors.

core The main logic circuits of a microprocessor chip (CPU). The term usually refers to the microarchitecture (internal design) of a CPU, exclusive of buses and caches. For example, Intel's Pentium III and Celeron processors have virtually identical cores, even though they have different configurations of L2 caches and buses.

core-logic chipset two or more chips on the motherboard of an IBM PC-compatible computer that connect the CPU to other system devices. The system chipset defines many of the features of a PC: how much main memory (RAM) it can hold, how many expansion slots it has, how much memory it can cache, and so forth.

Command Tag Queing A feature of the SCSI-2 protocol that allows device controllers to accept and queue multiple commands from multiple host processes without waiting for a pending I/O request to be completed, resulting in a more efficient SCSI bus. Basically, it allows devices to immediately accept and execute other commands while data that has already been read or written is sent back up the bus to the SCSI host adapter. It also allows the device controller to execute commands in a different order than they may have been received from the host adapter. Performance improves significantly when a device is optimized to execute commands in a more intelligent order.

Connect/Disconnect Allows multiple connected drives to share SCSI bus bandwidth by allowing them to disconnect individually from the SCSI bus when other drives/devices have information to send.

Coppermine Intel's codename for its newest Pentium III based on 0.18-micron technology.

Cube environment mapping An advanced environment-mapping technique that that applies the reflection of the surrounding game environment on a texture through a six-sided cube. Cube environment mapping is considered more accurate than standard environment mapping since the reflections captured by the six projected faces of the cube map are constantly updated.

D

Data buffer A data buffer is an internal memory area used for temporary storage of data records during input or output operations.

Direct RDRAM Rambus Dynamic Random Access Memory. It's a proprietary but widely licensed memory standard controlled by Rambus that transfers data much faster than current standards such as EDO RAM and SDRAM. The latest incarnation, Direct RDRAM, supports transfer rates as high as 800MHz, compared to 66MHz for EDO RAM and 100MHz for SDRAM.

Dolby 4.1 An approved spec by Dolby using four discrete channels for surround sound.

Dot product bump-mapping A hardware-accelerated bump-mapping technique that simulates tactile surface details by laying down bump maps on top of texture maps. It differs from environment-mapped bump-mapping (EMBM) in that lighting calculations are done on a per-vertex basis, as opposed to EMBM's per pixel lighting.

Double Data Rate SDRAM The next evolution of SDRAM that doubles the memory bandwidth by receiving data on both the rising and falling edges of a clock.

DSP Digital signal processor. A special type of microprocessor chip that's optimized for performing repetitive operations on large sets of data. DSPs are often used for communications, networking, multimedia, and other specialized tasks.

DVI A new all-digital flat panel interface that is designed to minimize the introduction of signal noise, and deliver a truer screen display than the previous analog RGB standard, which converted video signals to analog and back before appearing onscreen.

E

(E)IDE Enhanced Integrated Drive Electronics. A motherboard interface for connecting hard drives, CD/DVD-ROM drives, and removable storage devices.

F

FAT16 A 16-bit DOS and Windows file system (see FAT) that varies cluster sizes based on hard drive size. Cluster sizes range from 2K (for drives up to 127MB), to 4K (255MB drives), 8K (511MB drives), 16K (1GB drives). and 32K (for drives up to 2GB). The ultimate capacity of a FAT16 partition is 2GB.

FAT32 A 32-bit file system that was introduced with Windows 95 OSR2 that uses 4K cluster sizes for all drive sizes with a maximum capacity of 8GB.

FireWire IEEE 1394, as it's commonly referred to, was conceived by Apple Computer and then developed within the IEEE 1394 Working Group. The spec allows for the transport of data up to 200Mbps, the ability to add and remove devices without powering them down first, and the ability to daisychain up to 63 devices with cable lengths up to 14 feet.

Fill rate The number of pixels that a videocard pumps on screen during a fixed span of time; measured in millions of pixels per second.

Flashing Colloquial phrase for writing over system hardware with new commands or codes. Commonly "flashed" items include the BIOS in your motherboard or graphics card.

Floating-point A fractional number, such as 9.95 or 98.6. Computers have a more difficult time working with floating-point numbers than they do with integers (whole numbers), but the higher precision of floating point is required for some operations.

4x AGP See AGP 4x

G

Global Positioning System a.k.a. GPS; a satellite network that can pinpoint your location on earth by triangulating three distinct satellite signals.

I

ICBM Intercontinental Ballistic Missile. These baddies fly long distances to kill people in faraway countries.

IEEE 1394 Also known as FireWire in the Macintosh market. A high-speed bus protocol that transfers data at up to 400Mbits per second. 1394 is a great interface for digital video peripherals and may someday be used for high-speed modems.

L

L1 cache The first level cache or buffer that the CPU stores commands or information in.

L2 cache The second-fastest memory available to a microprocessor (second only to the Level 1 cache). It usually consists of SRAM chips near the processor, although some recent processors have on-chip L2 caches. Because the CPU runs faster than the memory bus—say 400MHz versus 100MHz—cache becomes useful to temporarily store instructions and data, making sure the CPU has a steady supply of material to churn while memory catches up. Also known as secondary cache.

M

Magnetoresistive Magnetoresistive heads use separate read and write elements for optimized read and write capabilities. The read element is composed of a thin-film material whose resistance changes when near a magnetic field. This in turn produces a stronger signal that allows for greater areal densities and larger disk capacities.

Memory Stick Sony's proprietary digital storage medium. The Memory Stick is about half the size of a stick of chewing gum and can store up to 32MB of data, or 20 times that of a traditional floppy disk. Many Sony peripherals, including notebooks, digital cameras, and picture frames, support the Memory Stick architecture and interface, but integration by other companies is limited at best.

Mplayer An online service that hosts multiplayer games.

Multithreading Most often referenced when talking about operating systems. Back in the DOS days, single-threaded programs predominated. These were programs that executed only one path through their code at a time. Multithreaded programs may have several threads running through different code paths simultaneously.

O

Opcodes Operation code. A programming instruction that tells the CPU what to do—add, multiply, branch, whatever.

P

PC100 SDRAM A specification from Intel for designing memory chips that support the 100MHz system bus in Pentium II CPUs in 1998.

PC133 A memory spec designed to supercede 100MHz PC100 memory. PC133 runs at 133MHz.

PCB Printed Circuit Board. Any one of the familiar green or brown boards that features chips and other types of electronic circuitry. Motherboards, videocards, network cards—they're all PCBs.

Predictive Failure Analysis A drive monitoring technology created by IBM to increase reliability of hard drives. PFA monitors key device performance indicators for change over time or exceeding specified limits. The device notifies the system when an indicator surpasses a pre-determined threshold.

Procedural texture A vector-based (mathematically defined) texture used to map temporary effects such as bullet holes and blood splatters on a polygon's surface.

R

Register A small storage cell in a microprocessor that temporarily holds numbers used by a running program. Usually the registers are 16, 32, or 64 bits wide. Program instructions put values in the registers, perform operations on the values, and copy the results back to memory.

Router A highly specialized computer for networking. Routers receive the packets of data that travel over networks (such as e-mail messages and web pages) and forward them toward their destinations. All network and Internet traffic goes through routers.

S

Shadow mask The most popular CRT monitor technology. The shadow mask itself is a metal grid. The monitor's electron beam is shot through the grid, which positions the beam so that it correctly excites the red, green, and blue phosphor dots that ultimately comprise the picture you see on the screen.

Slocket A Slocket is an adapter card that allows Socket 370 CPUs to be used on motherboards that accept Slot 1 CPUs. The Slocket is a flat card with a Socket 370 on its surface and Slot 1 connectors on its edge. The Socket 370 CPU is plugged into the Slocket, which is then inserted into the Slot 1 on the motherboard, effectively allowing Slot 1 motherboards to utilize newer, Socket 370

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Celeron CPUs.

S.M.A.R.T. Self-Monitoring Analysis and Reporting Technology monitors the hard drive for possible problems that may occur due to predictable failures using the parameters set by the drive manufacturer. Both the motherboard BIOS and drive itself must support S.M.A.R.T.

Slot 1 An interface that attaches Intel microprocessors to motherboards. Introduced with the Pentium II, it's a slot that accepts a daughtercard, which in turn contains the processor and Level 2 (L2) cache. It's electrically compatible with Socket 8. Intel does not license Slot 1 to other processor makers. It currently runs at 66MHz or 100MHz.

S/PDIF Sony/Philips Digital Interface. A standard interface for sending digital audio data. Soundcards with S/PDIF jacks let you use your computer as a mini recording studio.

SSE Streaming SIMD Extensions. A set of 70 instructions from Intel that speed up the Pentium III's floating-point, integer, and memory streaming power. SIMD stands for Single Instruction Multiple Data. This processing strategy tells a single programming instruction to perform the same operation on two or more pieces of data.

T

3DNow! A set of 21 instructions that speed up 3D graphics and other tasks on x86-compatible processors. The instructions essentially double a processor's floating-point power, which is integral for setting up polygons and lighting effects in 3D games. The games, however, must be coded to leverage the instructions; otherwise, they'll simply make calls to the processor's "normal" floating-point unit.

Texture compression The ability to shrink texture data down from a larger size down to a smaller size by replacing certain types of data (determined by the compressor) deemed redundant and replacing it with an approximation that will be used in the lower-sized palette. This often results in lower-colored textures and could also cause some visual artifacts to be introduced, resulting in a dithered effect.

Transform and lighting The geometry setup portion of the 3D pipeline. The transform stage translates 3D geometry descriptions into 2D vertex data, and the lighting stage resolves how each light source in a scene interacts with each 3D object.

Triangle rate The number of triangles that a CPU or graphics processor can draw onscreen during a fixed span of time; measured in millions of triangles per second.

3D pipeline Refers to the stages involved in 3D rendering. Conceptually the 3D pipeline is divided into geometry setup (the transform and lighting stages) and triangle setup (the rendering and rasterization stage). Geometry setup needs to occur before triangle setup.

U

UDMA Ultra Direct Memory Access. The fastest IDE protocol for connecting hard drives and removable storage devices. Capable of 33Mbps throughput.

Ultra 2 Doubles the total bus throughput of Ultra Wide SCSI from 40MB/sec to 80MB/sec, by increasing the clock rate to 40MHz.

V

VC133 Virtual Channel 133 memory. A subset of the PC133 SDRAM spec (see PC133), VC133 uses a tiny bit of faster static RAM that acts as buffer or cache. VC133 is currently manufactured only by NEC and similar techniques can be applied to other forms of RAM.

W

We We are family. I got all my sisters and me.

X

x86 A microprocessor architecture invented by Intel and widely copied by other companies. The 486, Pentium, Pentium Pro, Pentium II, Celeron, Xeon, AMD K6, Cyrix M II, and Centaur WinChip are all x86-compatible CPUs. The first x86 chip was the 8086.

glitch

BY JON PHILLIPS

Gordon Freeman?

COME ON DOWN!

In early September, we posted a call to arms on our web site, asking readers to submit photos for our Gordon Freeman Stunt Double Contest. Our intention was to find the "closest visual match" to the Gordster himself, the mythical protagonist of *Half-Life*, our choice for Game of the Year. The Freeman proxy's prize? A ridiculously fast GeForce videocard.

Early submissions consisted of a smattering of digital images that neither looked like Herr Freeman, nor showed any extenuating creativity whatsoever. But as the Oct. 1 contest deadline approached, the submissions picked up momentum in both quantity and quality. By late in the evening of September 30th, the last-minute Gordy-come-latelies were flooding in. We even received some pleas for rules clarification: "My HEV suit isn't ready yet! I have until 12 midnight, right?"

The final entries were definitely worth the wait.

William Almas wins the GeForce card for having a decidedly Freemanesque genetic disposition. He also gets kudos for effective use of hair gel, van dyke trimming, and crowbar wielding. William is currently the pathetically underpowered owner of a Voodoo Rush card, so the GeForce should serve him well.

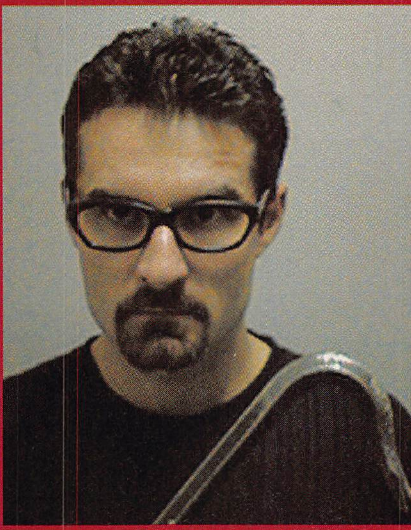
Given the ingenuity that ran deep through many other entries, we also decided to award special-recognition prizes for the most creative use of props and best costume. After all, genetic similarities can only take a budding Gordito so far in life—half, full, or otherwise.

On the creativity tip, Jason Holtslander blew us away with a series of digi-pics that redefine the phrase "uncompromising gorditude." His image archive can be found at **www.planethalflife.com/creativecreations/contest.html**. Todd Yocum, meanwhile, takes honors for best costume. Some of us dug the alien baby, others appreciated the Beastie Boys "Intergalactic" robot rip-off, and still others were intrigued by the fact that Todd's photographer is named Anastasia. That's a pretty name. We'd like to know more about lady Anastasia.

Jason and Todd will win some killer pieces of hardware to be named later. We have to peel through the lab and decide what we can give away without getting in trouble. We'd like to avoid the wrath of both the manufacturers who made the components and the federal agency that monitors shady contests of this type.

Finally, we decided to publish some of the funnier, quirkier, and frankly, more bizarre submissions. These photos… oh crap, we can't lie to you: These photos were chosen because they inspire obnoxious caption writing. For their trouble, these Gordonos-in-waiting will win some *Maximum PC* paraphernalia—T-shirts, baseball hats, maybe a 650MHz Athlon or two. You know, whatever we find wedged between the seat cushions of the Maximum Sofa.

Thanks for entering, everyone! And keep your eyes peeled on **maximumpcmag.com** for more contest announcements. Next time, we'll be sure to sponsor a stunt double contest for a fictional game character with big boobs. ✸

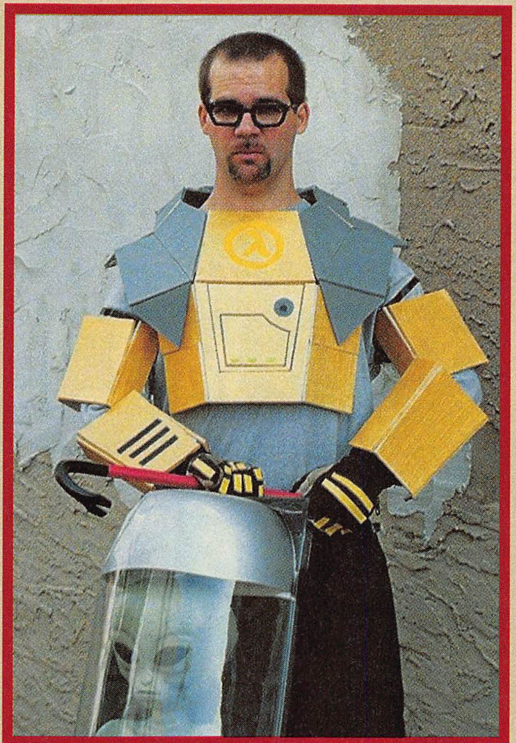


BEST LIKENESS: **William Almas**

"Once again... but this time with intensity!" Our friend from London Ontario, Canada, will crowbar anyone who would keep him from the GeForce.

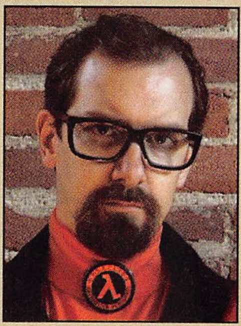
MOST CREATIVE: Jason Holtslander

Dig the access card, the overhead air ducts, the Franchi Spas-12 shottie. This Vancouver Canadian is ready to take the point in all campaigns of high-geek combat!



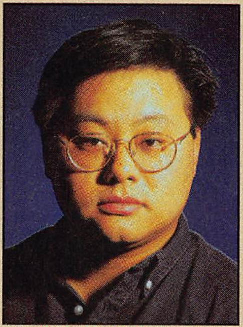
BEST COSTUME: Todd Yocum

"Intergalactic, planetary, planetary, intergalactic." Todd's HEV suit wouldn't withstand a Black Mesa acid bath, but it might withstand a South Lyon, MI, beer dousing.



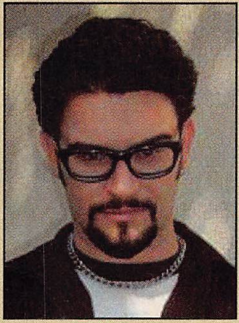
Satan Freeman

"For I am Arthur C. Kyle of Potsdam, NY! Worship me, frail mortal, worship me!"



Gordon Mah Freeman

Our own news editor is ineligible to win, but that doesn't stop us from telling him he was due in the test chamber a half-hour ago.

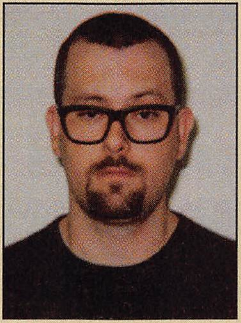


MTV Freeman

Somehow Sacha Howells' "Real World" application ended up at *Maximum PC.*

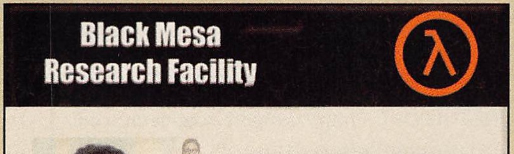
Hank Hill Freeman

"Mah name is Corey Nordin of Cow Bay, Canada. Ya'll need some propane or propane accessories?"



Government Issue Freeman

We know nothing about Brock Harris' background, but the hair and glasses say "15 to 20."



Black Mesa
Research Facility

Gordon Freeman

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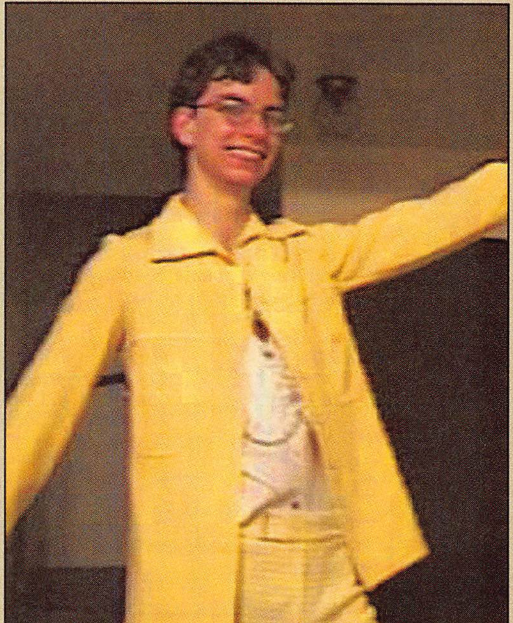
4066-72332-415

Vato Loco Freeman

"Attention James Ferris of Ottawa, Canada: You have clearance to enter the Gordon Freeman contest. Wear your Dickies flannel for maximum effect."

Eastern Bloc Freeman

Jan Harcarik in da house, representin' the Slovak Republic!



Disco Freeman

Andrew Kovacs, 17, of Cross Point, IN, really annoyed us with his leisure suit. You hold him steady, while we teach him how snuggies felt in the 70s.

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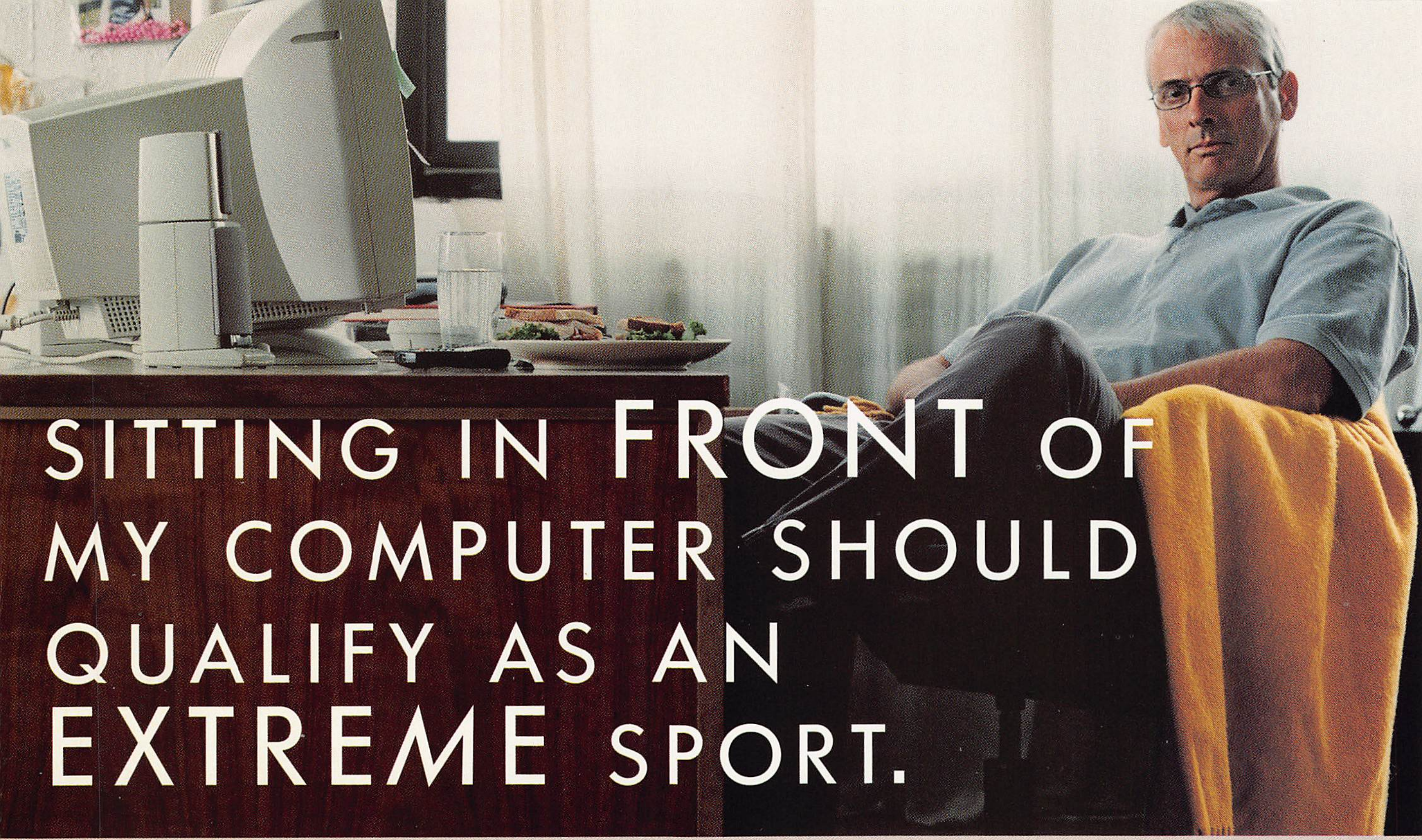

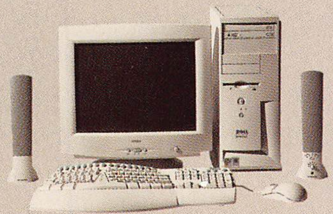

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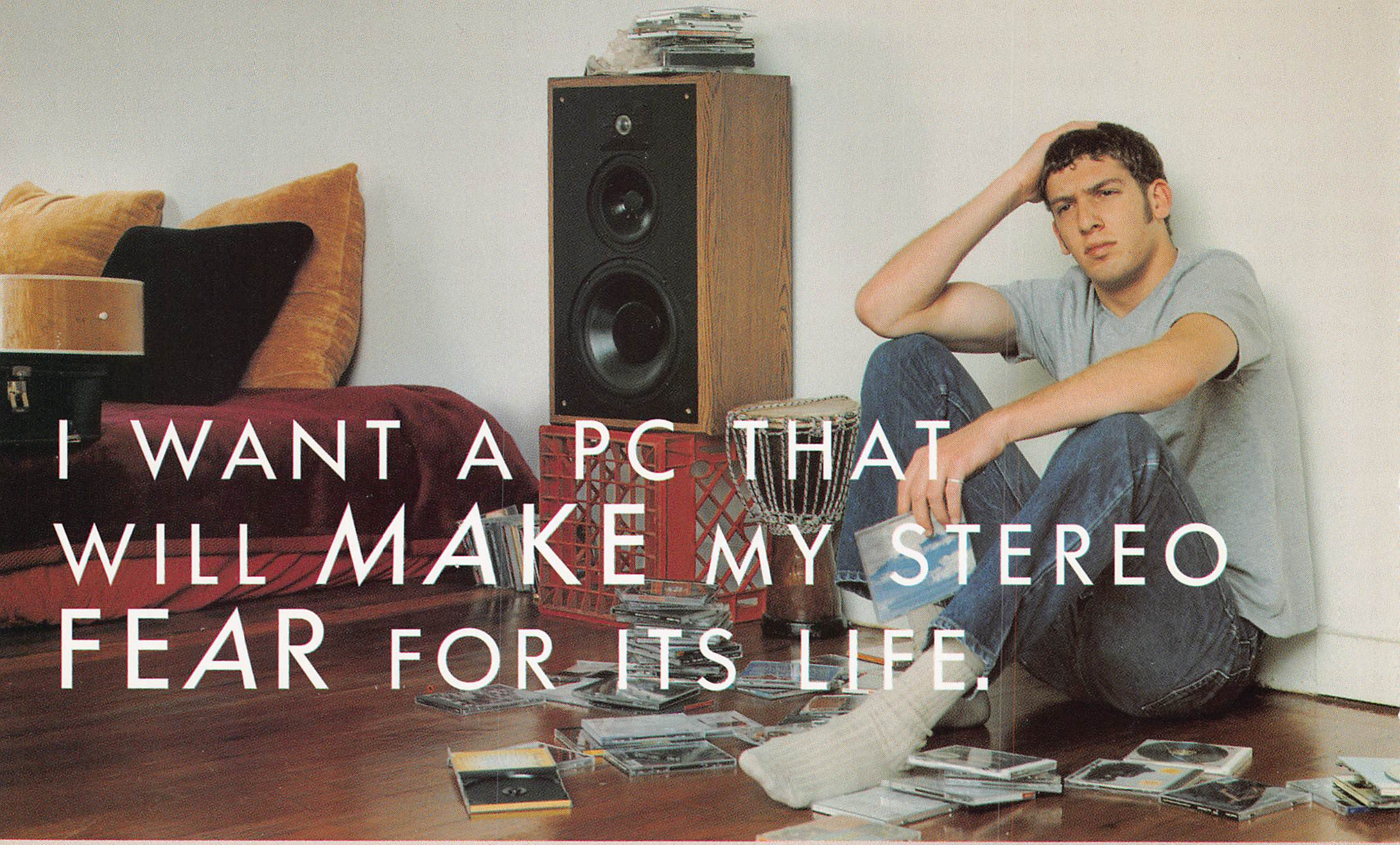

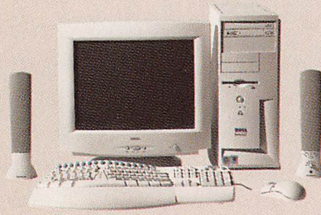

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